

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

# DIESEL PROGRESS



FIVE DOLLARS PER YEAR

APRIL, 1954

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# REMARKABLY CLEAN OPER

# WAY PAGE

## FOR 20 YEAR

diesels in this New Mexico pla  
run remarkably clean. There h  
of wear. Maintenance costs and  
consistently low.

To assure similar benefits, I  
one of the famous *Texaco Ursa*  
of lubricating oils especially ref  
dual-fuel engines give *more*  
*longer periods* between overha

The *Texaco Ursa* Oil series is  
builders and preferred by oper

*For over 20 years, m  
power in the U.S. has been lubricated with Texaco  
than with any other brand.*

Let a Texaco Lubrication Engineer help you get top per-  
formance from your engines. Just call the nearest of the  
more than 2,000 Texaco Distributing Plants in the 48 States,  
or write The Texas Company, 135 East 42nd Street, New  
York 17, N. Y.

TUNE IN:  
METROPOLITAN OPERA  
radio broadcasts  
every Saturday afternoon.  
See newspaper for  
time and station.



# TEXACO



Y

# NAVY ENGINES

ROBERG

URSA OILS

FOR ALL DIESEL, GAS  
AND DUAL-FUEL ENGINES

# REMARKABLY CLEAN OPERATION

**FOR 20 YEARS** the Texaco-lubricated diesels in this New Mexico plant (name on request) have run remarkably clean. There has been a minimum amount of wear. Maintenance costs and fuel consumption have been consistently low.

To assure similar benefits, lubricate your engines with one of the famous *Texaco Ursa Oil* series — a complete line of lubricating oils especially refined to make diesel, gas and dual-fuel engines give *more power with less fuel* over *longer periods* between overhauls.

The *Texaco Ursa Oil* series is approved by leading engine builders and preferred by operators everywhere. In fact —

*For over 20 years, more stationary diesel horsepower in the U.S. has been lubricated with Texaco than with any other brand.*

Let a Texaco Lubrication Engineer help you get top performance from your engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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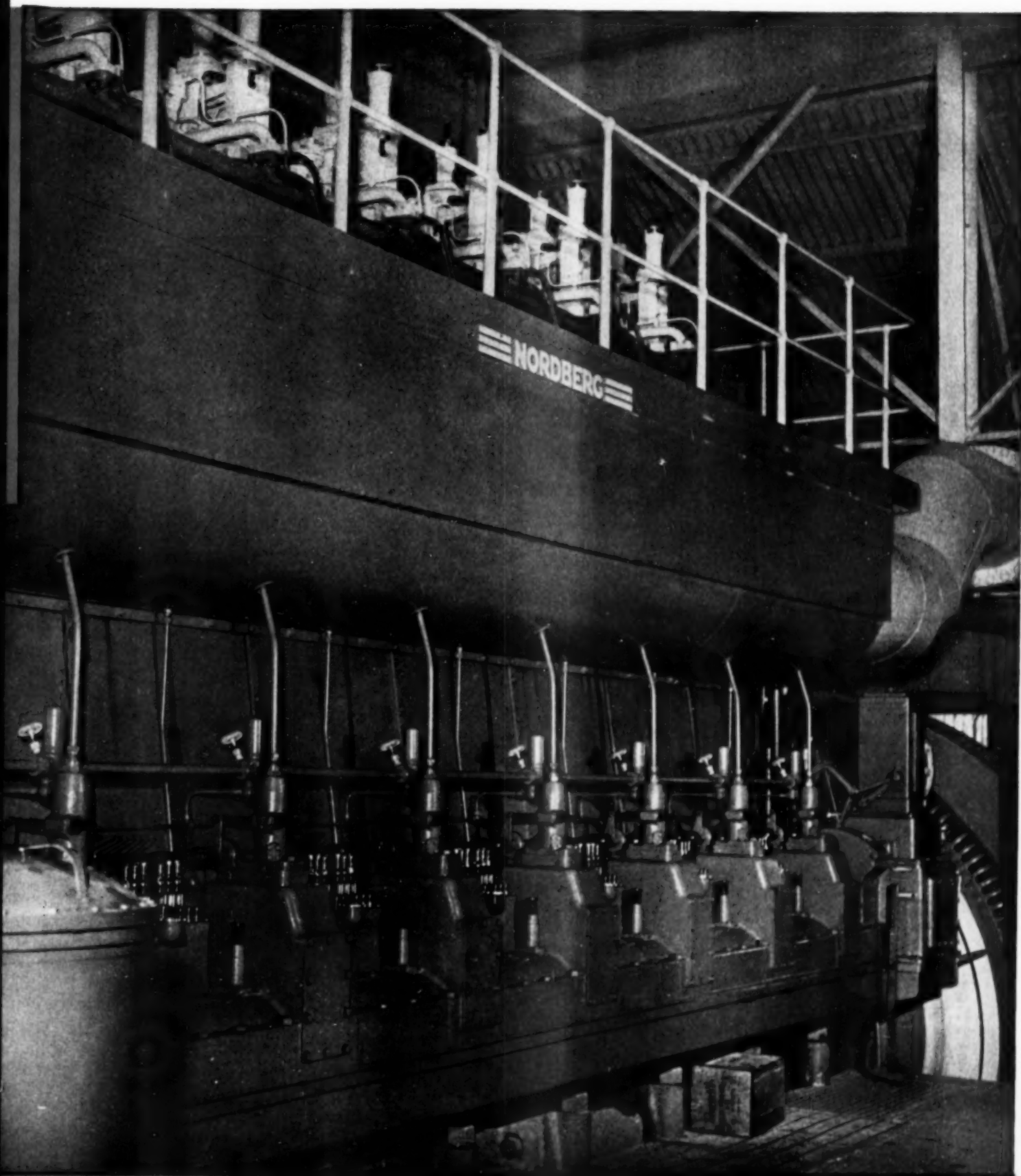


# TEXACO



Y

2



**URSA OILS** FOR ALL DIESEL, GAS  
AND DUAL-FUEL ENGINES



# 5

## SINCE '50 FOR ESSO

"Esso Tug No. 20" is the fifth General Motors Diesel-Electric powered tug to join the Esso Standard Oil Company fleet since 1950. With her sisters, Esso Tugs Nos. 9, 10, 11 and 12, she's now docking tankers and towing oil barges in and around New York harbor.

All Esso Standard tugs are GM Diesel-Electric powered. In more than three years' service these GM Diesels have proved their dependability and low-cost operation.

### CLEVELAND DIESEL ENGINE DIVISION

GENERAL MOTORS • CLEVELAND 11, OHIO

ENGINES FROM 150 TO 3250 H.P.



**Tie Up to GM Service**

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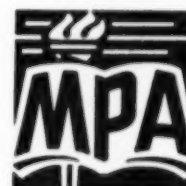


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## FRONT COVER ILLUSTRATION

The Navy Minesweeper AMS 116, one of a new class of Navy vessels. Propulsion power is by a pair of General Motors Model 268A, 8-cyl., 2 cycle diesels. The engines as well as all accessories and auxiliaries have been made as non-magnetic as possible.

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# Proving its mettle

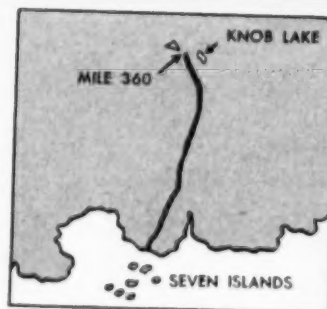
## IN A RUGGED LAND OF IRON

GM DIESEL  
CASE HISTORY No. 53-233

**USER:** Iron Ore Company of Canada

**INSTALLATION:** 12 GM Diesel-powered 34-ton Euclid IFFD trucks and 5 Allis-Chalmers HD-20 tractors used to strip and haul at Knob Lake. Part of a fleet of more than 200 GM Diesel engines powering all types of equipment for I.O.C.

**PERFORMANCE:** "They're doing a wonderful job," said Master Mechanic "Jock" Marshall. "Equipment takes a real licking up here, and GM Diesels stand up under it."



## More than 200 GM Diesel Engines on vast Ungava Project

Up at "the Knob," 360 miles above Seven Islands terminal, the Iron Ore Company of Canada relies on General Motors Diesel-powered equipment—just as it has in construction of railroad, dams and facilities all along the line.

The big double-engine "Euc" and HD-20 shown above are benching access road to the rich Ruth Lake #3 deposit, first in the area to be opened for mining. They are part of a GM Diesel-powered fleet that proved its mettle by "walking" to the end of the line under its own power—a 250-mile trek over frozen tundra in blizzards and temperatures that reached 40° below zero.

These quicker-starting, faster-accelerating 2-cycle Diesels have been delivering trouble-free performance on double-shift, 20-hour-a-day schedules ever since they arrived—a tribute to both their rugged stamina and I.O.C.'s excellent preventative maintenance program.

Whatever your need for power—in trucks, tractors, air compressors, cranes, shovels—why not learn firsthand how much more profitably and dependably this versatile GM 2-cycle Diesel can deliver it? There is a GM Diesel distributor near you who will gladly give you all the facts—and you can count on him for prompt, efficient parts supply and service wherever you are.

### DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN

Single Engines . . . 16 to 275 H.P. Multiple Units . . . Up to 840 H.P.

*It pays to STANDARDIZE on*

... available in more than 750 models of equipment built by over 150 manufacturers.

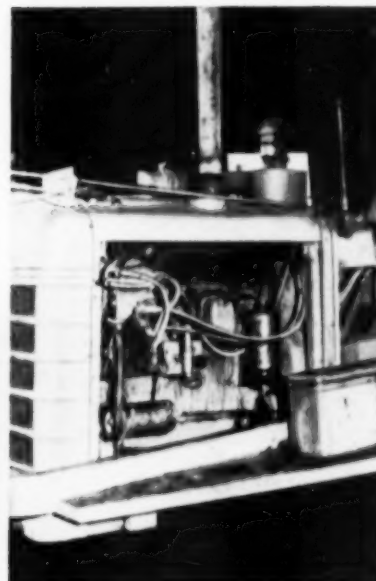




# The Engineer's Report

CASE HISTORY

LUBRICANT *RPM DeLo Oils*  
FIRM *Dana Company, Inc.,  
Apple Valley, Calif.*



This paving machine diesel worked more than 2400 hours, laid 85 miles of asphalt highway before even the head was removed.

## No bearing, ring trouble in 6 years desert operation!

Sand, wind, dust and heat are tough on engines in the California desert where Dana Company, Inc., develops subdivisions, builds and paves streets and highways. But, using RPM DELO Lubricating Oils, not one engine lost a bearing or stuck a ring in 6 years. Even with constant dust conditions and rapid temperature changes—often from below freezing to 75°F. in a morning—they have no carbon and sludge problem. "RPM DELO Oils keep our engines very clean and cut repair costs," says Mr. Ross Dana, President. "One diesel in a paving machine laid 85 miles of asphalt, worked 2400 hours before it was touched. Then, only a valve grind was needed."

FREE FOLDER tells you about all the RPM DELO Oils and how they meet every heavy-duty engine condition. Write or ask for it today.

FOR MORE INFORMATION about petroleum products of any kind or the name of your distributor, write or call any of the companies listed below.

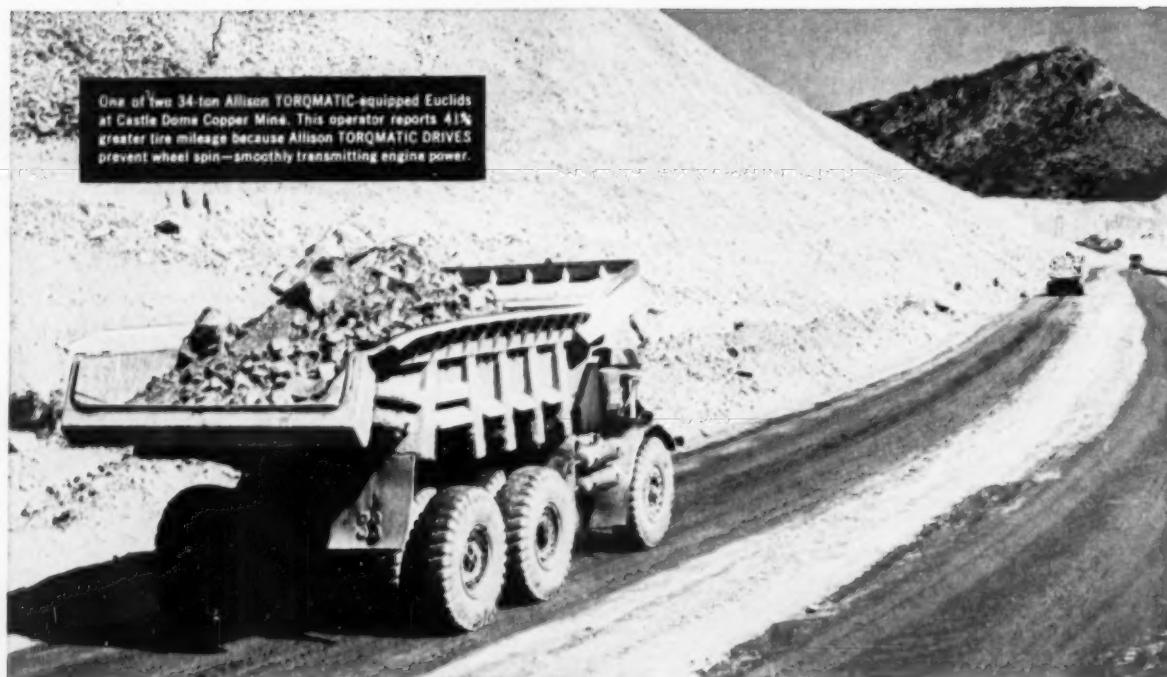


### How RPM DELO Oils reduce wear, corrosion, oxidation in all Heavy-Duty Engines



- A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent piston scuffing.
- C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso  
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado



## **"41% longer tire life"**

Castle Dome Copper Company reports it gets 17,000 miles per tire on off-highway trucks equipped with Allison TORQMATIC DRIVES compared to 12,900 miles per tire on mechanical-drive units. But increased tire life is only part of the story—the firm also reports the TORQMATIC-equipped "Eucs" have better availability and production records.

This operator runs a fleet of 12 trucks—2 TORQMATIC-equipped "Eucs" and 10 mechanical-drive units—hauling 390,000 tons of ore and overburden per month up 8% grades on mile-long runs. The "Eucs" average 25.3 trips per 8-hour shift, each hauling about 58,000 tons per month.

TORQMATIC DRIVES smoothly transmit engine power—help prevent wheel spin that can quickly strip the tread from a tire. There's no clutch pedal to push and only three forward gearshifts—instead of the usual 7 or 10—handle all loads and grades. The matched converter-transmission team balances engine power and load demand, absorbs harmful drive-line

shocks, prevents damage to drive-line components, helps stop engine lugging.

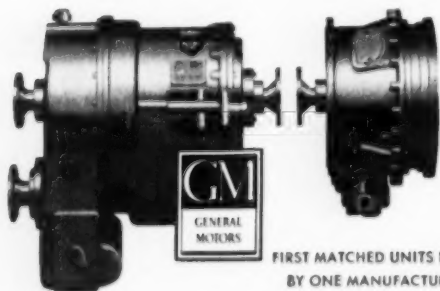
You, too, can cut your operating costs by specifying Allison TORQMATIC DRIVES the next time you buy. Ask your equipment dealer, manufacturer or write:

Allison Division of General Motors  
Box 894D, Indianapolis 6, Indiana

### **ALLISON TORQMATIC DRIVES**

Unbeatable Team for Maximum Operating Economy

- **Cuts** driver training costs
- **Quick-Shifts** at full throttle with fingertip hydraulic control
- **Holds** power to load at all times—no clutch pedal to push—no gearshift guess
- **Reduces** maintenance costs by absorbing shock—eliminates engine lugging—prolongs equipment life
- **Only** torque converter-transmission team designed to work as a unit and built by one manufacturer



FIRST MATCHED UNITS BUILT  
BY ONE MANUFACTURER

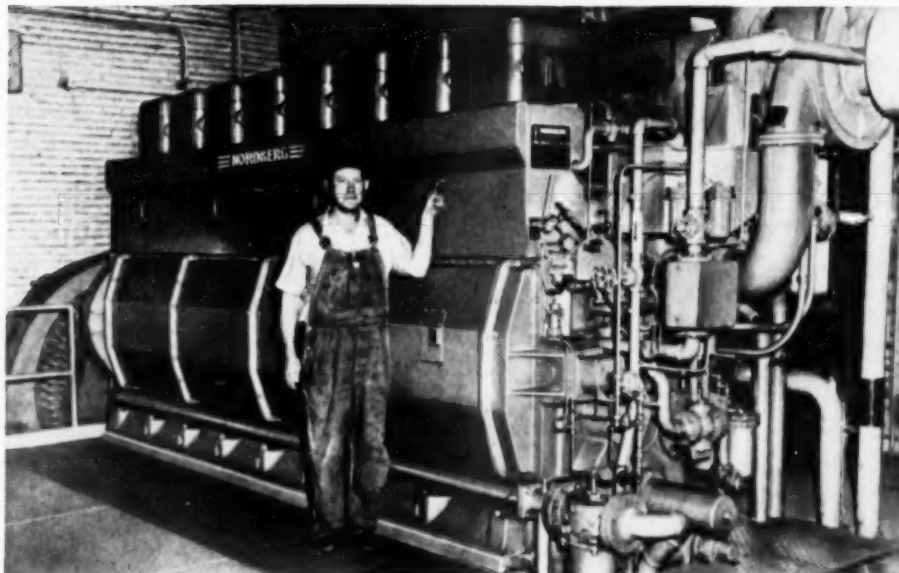
*Allison*

**TORQMATIC DRIVES**

COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES • TRUCKS  
TRACTORS • SCRAPERS • SHOVELS • DRILLING RIGS



**This engine maintains  
a lubricating oil economy  
of approximately  
18,000 H.P. hrs. per gallon**



*Here's operating efficiency as it has been proved at the  
Municipal Power Plant, Lindsay, Oklahoma.*

A lot of the lubricating oil economy can be credited to the piston rings installed in this Nordberg Dualfuel engine. They are Koppers American Hammered Piston Rings. (Porous Chrome\*, Tapered O. D., and Grooved Oil Cutter Rings.)

Many manufacturers of diesel and pumping machinery insist on Koppers Rings for their equipment because they know that Koppers Rings make for satisfactory performance.

Test after test also prove that, when Koppers Rings are used for replacements, operating efficiency, and economy are markedly increased . . . often doubled. And Koppers Rings last so much longer that labor costs and costly down-time for repairs are greatly reduced.

So, to save on lubricating oil, to cut down costs, to help save on fuel, remember Koppers. Next time you have an overhaul, think of Koppers first. We are always ready to consult with you on your specific piston ring problems. And for the latest information on Koppers Rings, mail the coupon below.



**METAL PRODUCTS DIVISION • KOPPERS  
COMPANY, INC. • Baltimore, Maryland**  
This Koppers Division also supplies industry with  
Fast's Couplings, Aeromaster Fans, Koppers  
Electrostatic Precipitators and Gas Apparatus.  
*Engineered Products Sold with Service*

## **AMERICAN HAMMERED Industrial Piston Rings**

**KOPPERS COMPANY, INC., Piston Ring Dept., 1584 Hamburg Street, Baltimore 3, Md.**  
Gentlemen: Please send me free 16-page booklet containing full information on Piston Rings.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



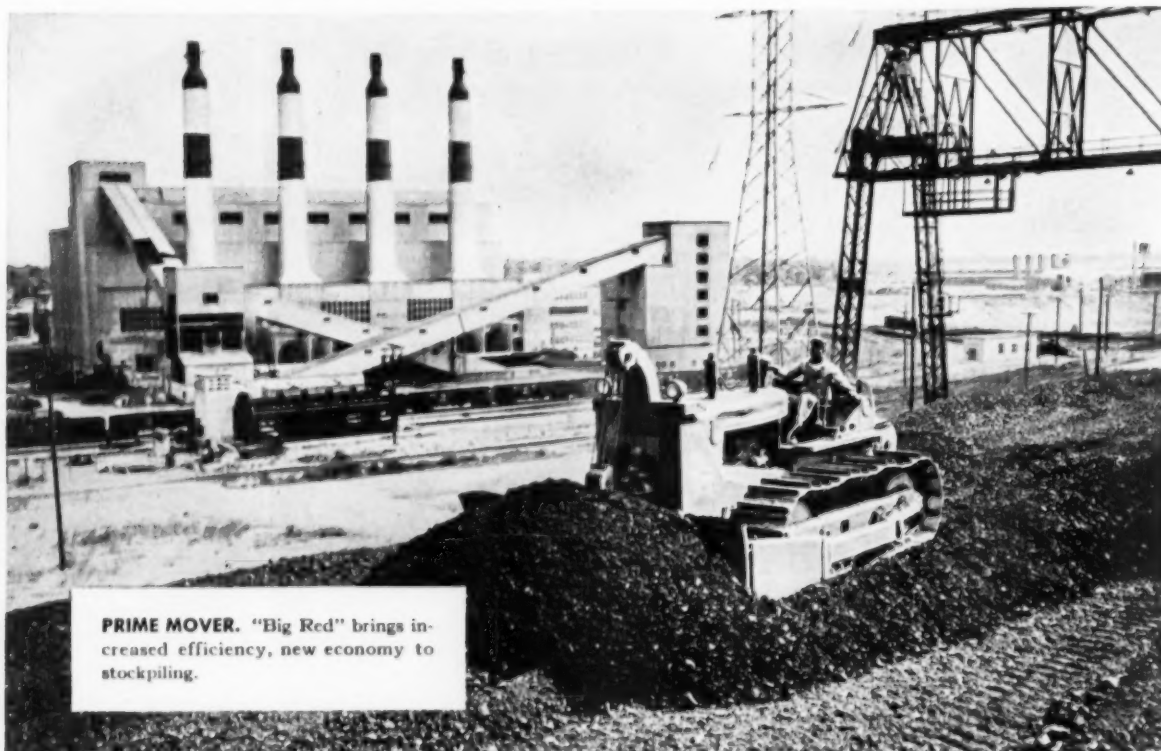
Koppers Porous Chrome\* Rings. Porous chrome surface holds and distributes oil during break-in. Seats quickly. Chrome prevents grit from embedding in ring surface. Prevents cylinder wall scratching. Reduces wear 50%. Lasts 4 times longer than other rings.



Koppers Oil Cutter Rings maintain high unit pressure on the oil film. Seats rapidly. Slots in back of ring permit oil collected in channel on down stroke to flow into interior of piston. Proved efficient in thousands of installations. Extremely popular in vertical compressors and internal combustion engines.

\*Van der Horst Process

# Prime Mover on the Stockpile



**PRIME MOVER.** "Big Red" brings increased efficiency, new economy to stockpiling.

## get new coal-handling economy with **INTERNATIONAL'S Big Red TD-24**

When it comes to coal-handling, nothing beats an INTERNATIONAL TD-24.

"Big Red," with 148 maximum drawbar horsepower, puts coal in its place in a hurry, and at the same time delivers a most important extra service:

*It compacts the coal as it goes, sealing it against loss by fire started by spontaneous combustion.*

Here's what makes for "Big Red" outstanding performance:

**Planet Power Steering**—with finger-tip hydraulic control.

**Eight speeds forward, eight reverse**—up to 7.9 mph.

**Synchromesh transmission**—you shift "on the go."

**Push-button, all-weather starting** with INTERNATIONAL'S exclusive gasoline-conversion starting system.

See the big red TD-24 for yourself. Get the facts from your INTERNATIONAL Industrial Distributor. You'll be a TD-24 man from there on in!

**INTERNATIONAL HARVESTER COMPANY**  
CHICAGO 1, ILLINOIS

**For everything in Earthmoving**

**ON TRACKS ...ON RUBBER**

**See INTERNATIONAL'S  
Complete Earthmoving Line**



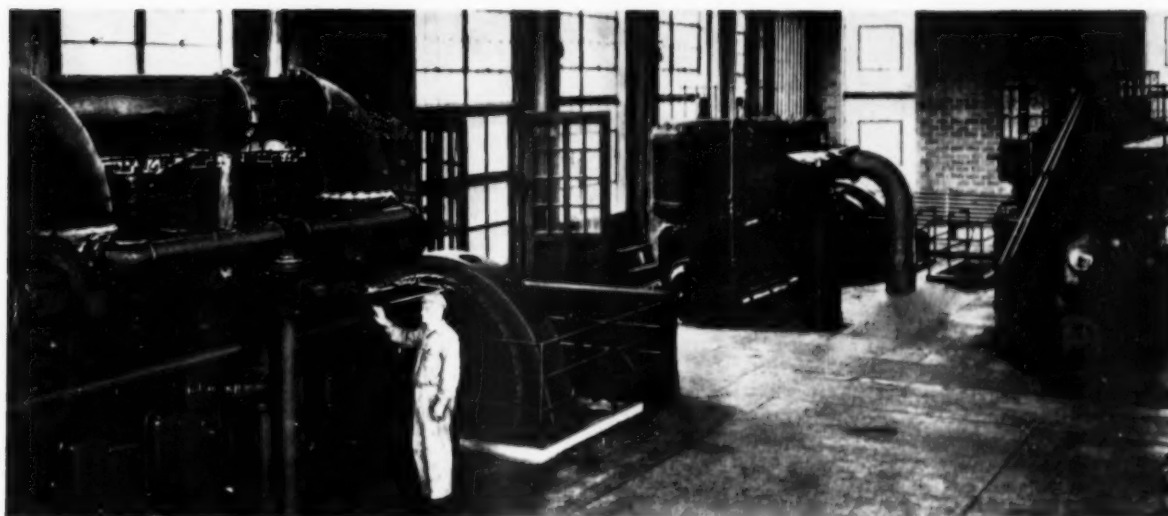
**POWER THAT PAYS**

**INTERNATIONAL**



H. L. Ostness, Chief Engineer, River Falls Municipal Utility, Wisconsin, says...

# "Sticking Rings are no problem in this Plant"



Mr. Ostness, as chief engineer of one of the oldest Municipal Power Plants in Wisconsin, knows diesels — *knows how to get the most out of them.*

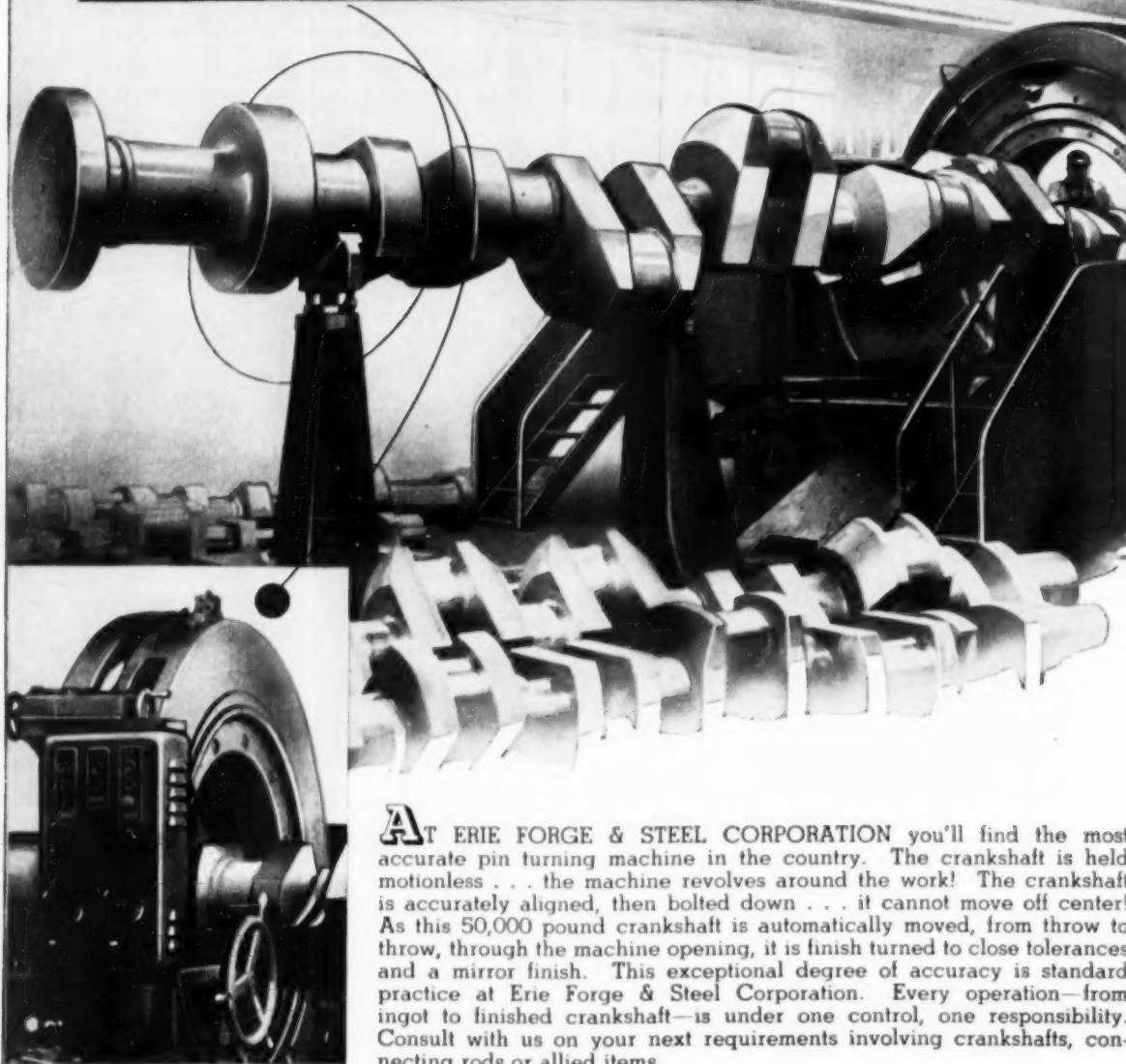
Mr. Ostness recently wrote, "We have used Sinclair Lubricants for over fifteen years very successfully. GASCON® and RUBILENE® H.D. have been doing an outstanding job in our diesels. Stuck rings is a trouble we know nothing about — engine wear is at an absolute minimum. With results like these, we'd recommend Sinclair Lubricants any time."

If your present lubricants do less, why not let Sinclair help you get longer life from your diesels — with less trouble. Contact your nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

**SINCLAIR DIESEL LUBRICANTS**  
*save wear and replacement*

## A PIN TURNING MACHINE that revolves AROUND the WORK?

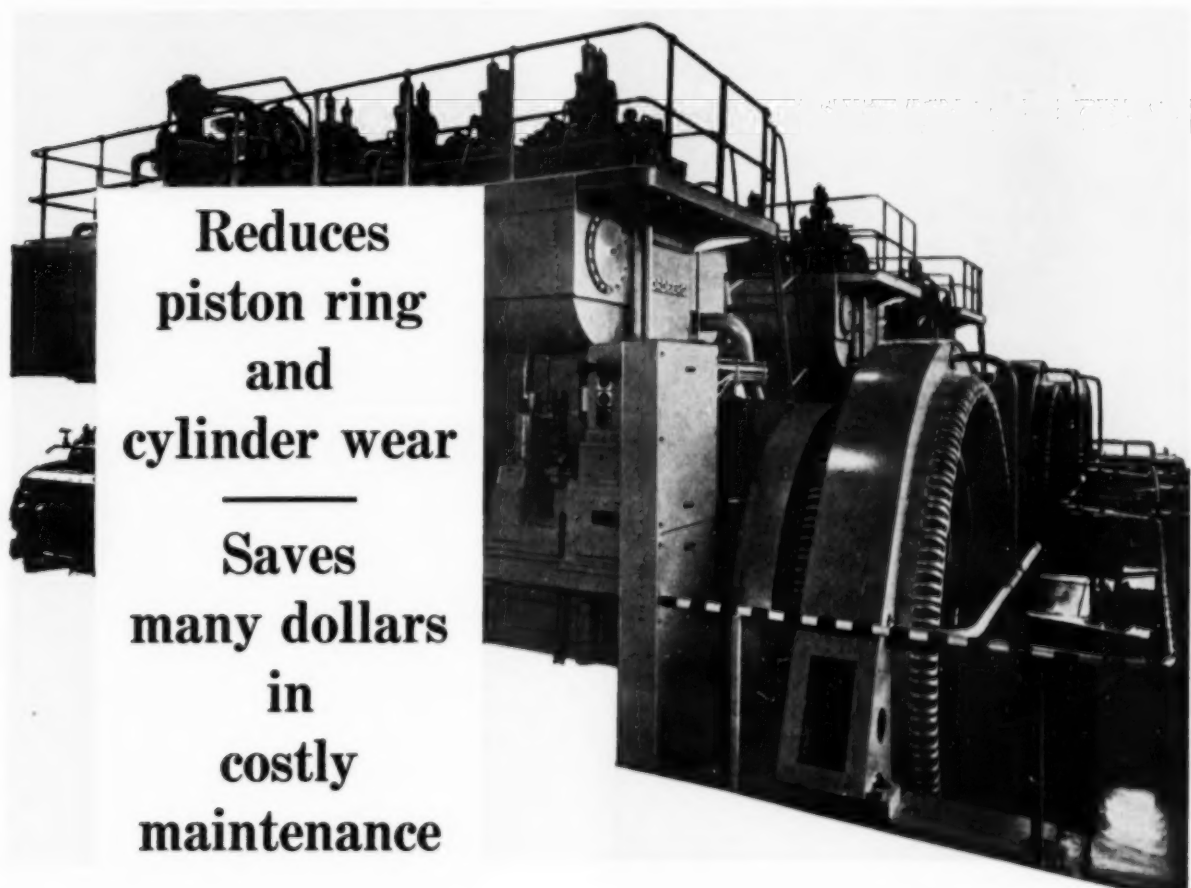
**This one does at ERIE FORGE —  
to achieve MAXIMUM accuracy!**



**A**T ERIE FORGE & STEEL CORPORATION you'll find the most accurate pin turning machine in the country. The crankshaft is held motionless . . . the machine revolves around the work! The crankshaft is accurately aligned, then bolted down . . . it cannot move off center! As this 50,000 pound crankshaft is automatically moved, from throw to throw, through the machine opening, it is finish turned to close tolerances and a mirror finish. This exceptional degree of accuracy is standard practice at Erie Forge & Steel Corporation. Every operation—from ingot to finished crankshaft—is under one control, one responsibility. Consult with us on your next requirements involving crankshafts, connecting rods or allied items.



# Shell Rotella Oil



**Reduces  
piston ring  
and  
cylinder wear**

**Saves  
many dollars  
in  
costly  
maintenance**

These dual-fuel engines in the Municipal Power Plant at Houma, Louisiana, supply dependable, low-cost electric power to the entire city. Shell Rotella Oil is the cylinder lubricant.

Here's just one of the many diesel power plants that depend on SHELL ROTELLA OIL for reduced wear of engine parts . . . lower maintenance cost.

The anti-corrosive action in Shell Rotella Oil combats the major cause of engine wear . . . cylinder and piston ring wear caused by acid ac-

tion from the by-products of incomplete combustion and condensation.

Tougher lubricating film in Shell Rotella Oil gives cylinders and rings greater protection . . . minimizes wear. Its effective detergent-dispersant action prevents harmful deposits.

Write for technical information. See for yourself how Shell Rotella Oil can help reduce your engine maintenance costs.

## **SHELL OIL COMPANY**

50 WEST 50TH STREET, NEW YORK 20, NEW YORK  
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA





for a fast "get under way"...

## GARDNER-DENVER AIR STARTERS

Smooth, safe starts, even under  
load. No battery maintenance.  
Bulletin AM-1.



SINCE 1859

# GARDNER-DENVER



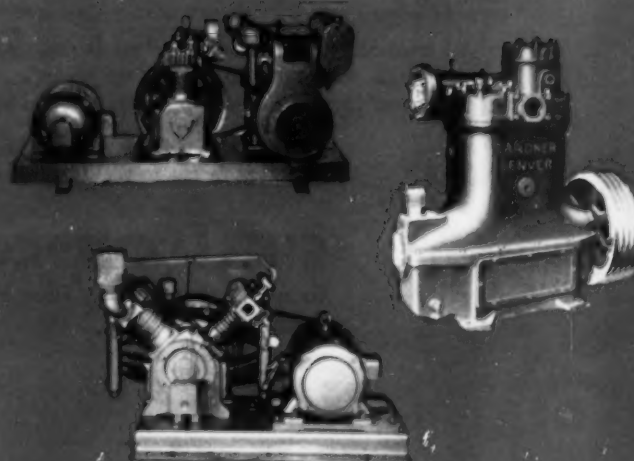
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS  
FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

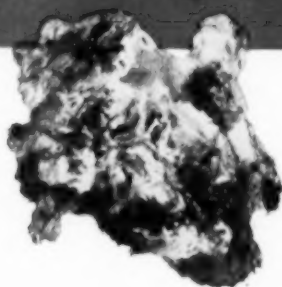
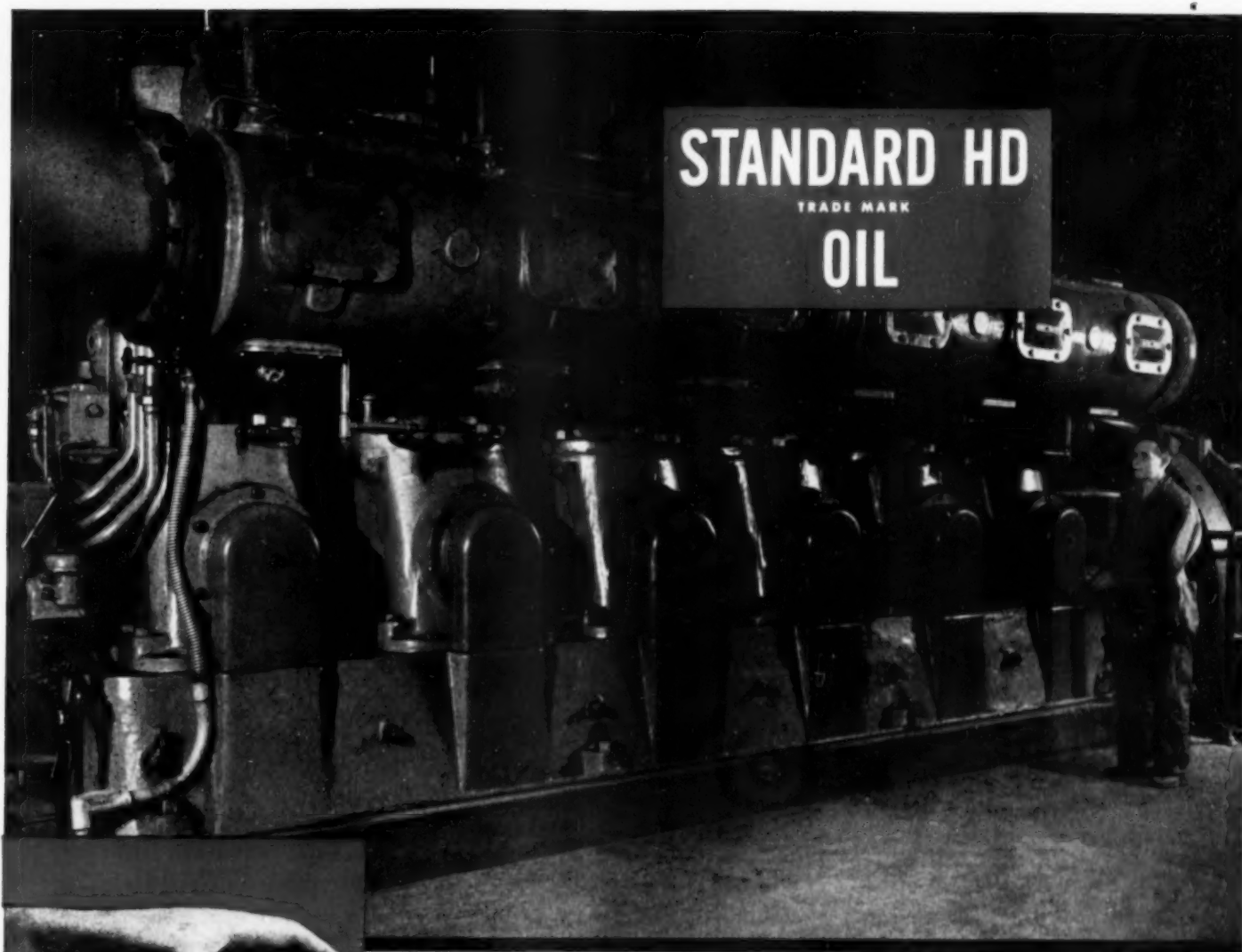
Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada) Ltd., 14 Curly Avenue, Toronto 13, Ontario

## GARDNER-DENVER AIR COMPRESSORS

Full air capacity—at the pressure  
you need—always standing by.  
Bulletins ES-1 and AA-6.





## They threw away the cleaning rags!

● When operators of this midwest power plant opened one of their three diesels for an inspection, they reached for their cleaning gear. The six cylinder engine, only two years in operation on an intermittent basis, was ridden with oil deposits from cylinder walls to crankcase. The lubricant used was a well-known product.

Operators took the advice of a Standard Oil lubrication specialist and switched their diesels to STANDARD HD Oil, a truly heavy-duty diesel lubricant.

Periodic analysis of oil samples showed that STANDARD HD maintained its high lubricating quality. Recently, after 5,000 hours'

operation on STANDARD HD, the six cylinder engine was opened, once again, for inspection. This time, operators found the engine in excellent condition and entirely clean.

Whether it's cleaner operation, less wear, or more efficient operation you are looking for; the Standard Oil lubrication specialist serving your area of the Midwest has the lubrication engineering ability and the outstanding diesel lubricant to help you reach your goal. You can reach this specialist, easily, by phoning your local Standard Oil Company office. Or, write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

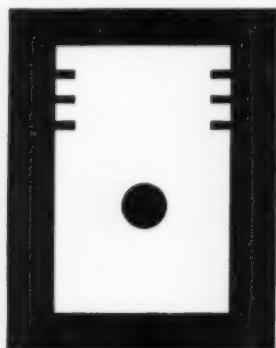
**STANDARD OIL COMPANY**



(Indiana)



## SOMETHING **BIG** HAS HAPPENED TO PISTON DESIGN FOR DIESELS!



Great steps have been taken to improve diesel engines in the past twenty years—but many are still using the same pistons they had two decades ago.

This is no fault of the engine builder—nor the piston manufacturer. Until present-day demands were made on the engines, these pistons did their job well. But today, the higher output engines demand something new—and **ALCOA HAS IT!**

For diesel manufacturers with engines in the design stage, Alcoa's research and development teams have produced new types of aluminum pistons which embody many highly desirable features. These new pistons are not yet in production, but Alcoa is ready to talk to builders of high output engines—and to discuss the possibilities of *greater power from the same size engine!*

These new pistons also have the same inherent advantages found in all aluminum pistons. Aluminum's high heat conductivity lowers surface temperatures and allows greater engine output without increasing operating temperatures. Alcoa® Aluminum Pistons weigh less—making possible greater engine speeds, stepped-up horsepower.

Alcoa's staff of research and development technicians is thoroughly trained in the diesel field—and will gladly co-operate with your own engineers and designers in extracting maximum horsepower from your engine with minimum design change. For complete information on *all* Alcoa Aluminum products for the diesel industry, write: **ALUMINUM COMPANY OF AMERICA, 1987-D Alcoa Building, Pittsburgh 19, Pennsylvania.**



ALCOA ON TV brings the world to your armchair with "SEE IT NOW" featuring Edward R. Murrow, Tuesday evenings on most CBS-TV stations.

# ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA



RED STAR TOWING AND TRANSPORTATION COMPANY



Mr. T. W. Drennen, Manager  
Fairbanks, Morse & Co.  
80 Broad Street  
New York 4, N. Y.



Dear Mr. Drennen:

As operators of a fleet of tugs for harbor and coastwise service for over seventy years, we have had experience with practically all types of propulsion machinery. We have operated Fairbanks-Morse Diesel engines in our boats for the past twenty-six years.

In service such as ours, stamina and dependability are a must. Ease of servicing, plus low maintenance, and most important, maneuverability have also been features of your engines. We would unhesitatingly recommend these engines to anyone requiring heavy duty, dependable Marine service.

One of the most modern tugs in our present fleet of sixteen tugs is the "HUNTINGTON" powered with your 8-cylinder, 1280 HP, Opposed Piston Marine engine. This tug has been outstanding in every type of service in which we have used it.

→ Ours is a tough business, but yours is a tough engine. ←

Sincerely yours,  
*Chester H. Sanders*

Chester H. Sanders,  
PRESIDENT



"You'll be enthusiastic, too,  
about Fairbanks-Morse diesel performance"

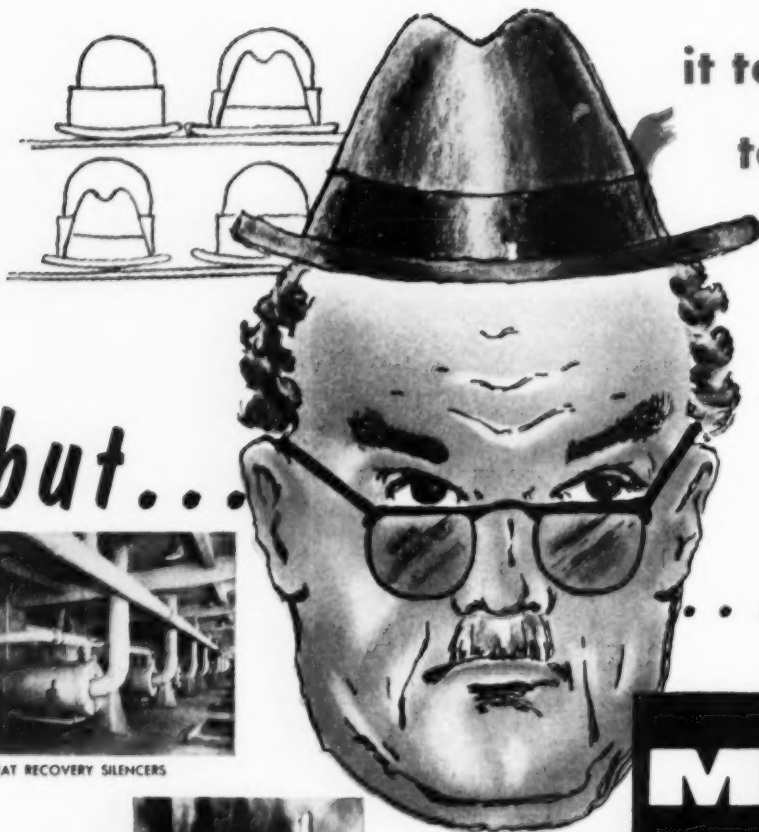


**FAIRBANKS-MORSE**

*a name worth remembering when you want the best*

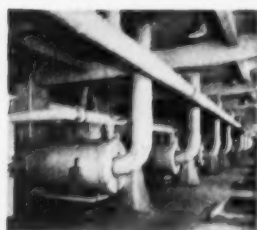
Fairbanks, Morse & Co., Chicago 5, Illinois

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

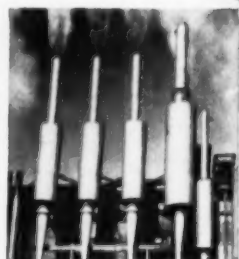


it takes a big stock  
to fit everybody

but...



HEAT RECOVERY SILENCERS



AIR or STEAM  
DISCHARGE SILENCERS



INTAKE  
SILENCERS



SPARK  
ARRESTOR  
SILENCERS

Engineers faced with special silencing problems find that it pays to *consult Maxim first*. They know that in almost every case Maxim can supply their needs "right out of the Maxim catalog" and still assure the "special" fit that the operation requires.

*Maxim offers 50 different standard models with sizes to fit any exhaust connection from 1" to 72".*

By specifying one of Maxim's standard models, you save costly time, engineering and installation expense. And you can be sure, even before the installation is made, that your Maxim Silencer will meet every performance test.

If your problem is silencing . . . consult Maxim.

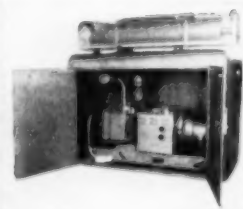
## THE MAXIM SILENCER COMPANY

94 Homestead Ave.

Hartford 1, Conn.



Dr. Shush



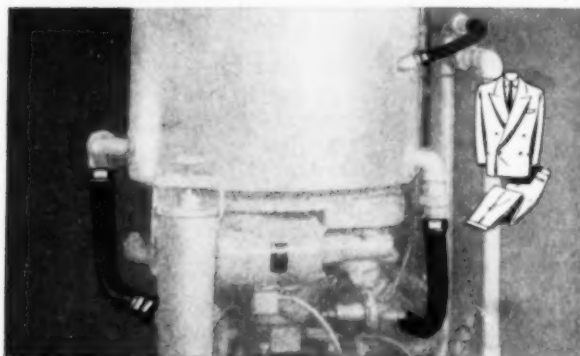
PORTABLE  
SILENCERS



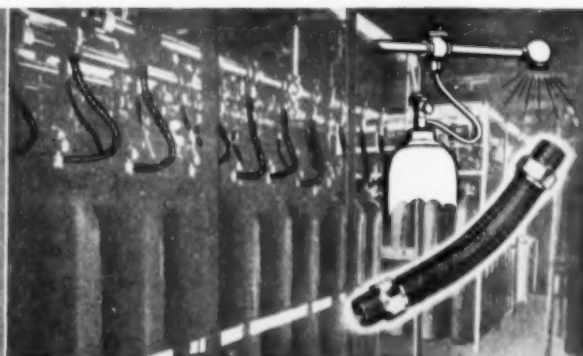
EXHAUST SILENCERS

16MX54

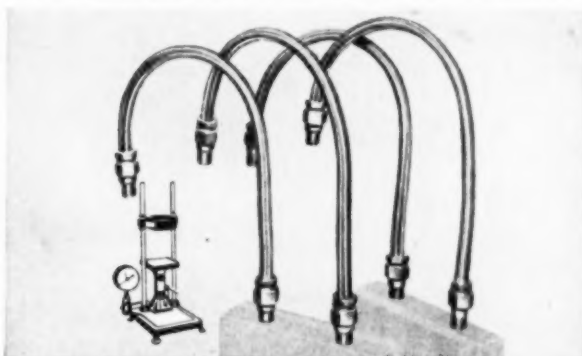
## Pick an idea—lick a design problem...



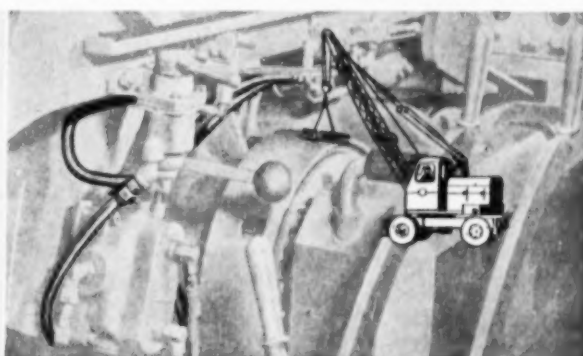
**END VIBRATION AND LEAKAGE.** Titeflex® metal hose, used as fill and drain lines of SEC Synthetic Cleaning Units, kills vibration and prevents solvent leakage at fittings. Tough, wear-and-corrosion-resistant Titeflex is just as effective in handling steam, oil, lubricants, fuels, gases, brine, acids, compressed air or oxygen. Design and construction of Titeflex assure trouble-free performance. Excellent for projects involving extreme configurations.



**CONTROL CRITICAL PRESSURES.** How would you connect 280 cylinders of fire-extinguishing carbon dioxide at 850 psi to line? Walter Kidde & Company licked this problem with Titeflex flexible metal hose which met all insurance standards and withstood rigid application requirements. Titeflex also conveys hundreds of different fluids under as many different temperature and pressure conditions. Resists corrosion, vibration, physical abuse.



**CONDUCT STEAM SAFELY.** Plates for Carver Laboratory Press carry steam up to 200 psi (nearly 400°F.) for heating—water for cooling. The connections are flexible, pressure-safe Titeflex. Braiding gives extra strength. Added problems of vibration, pulsation, continuous movement, corrosion or abrasion make Titeflex invaluable in scores of other applications.

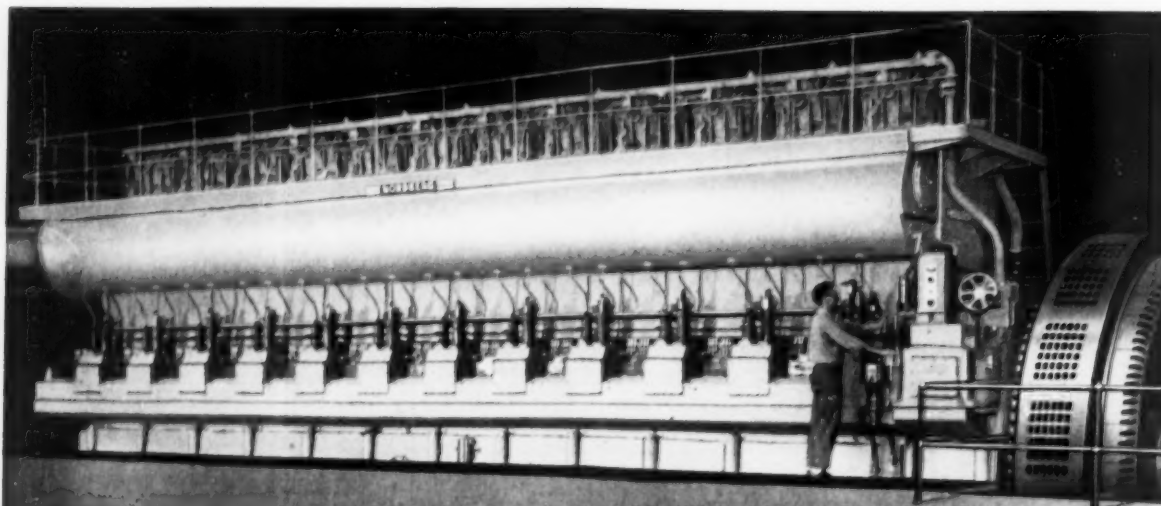


**FIGHT FATIGUE AND WEAR.** Titeflex metal hose eliminated maintenance on air control lines of Unit Mobile Cranes. All-metal construction, with braiding woven directly upon the hose, provides great strength and resistance to vibration, corrosion, wear and abuse. Flexibility of Titeflex permits simplified assembly even where space configurations are problems.

**THE USES FOR TITEFLEX®** seamed flexible metal hose and Uniflex seamless flexible metal hose are limited only by engineering ingenuity. And Titeflex design engineers—working *with* customers—develop new applications daily. Somewhere in your plant or on your products Titeflex can improve operation and maintenance—or simplify a design problem. Our new 48-page *Metal Hose Catalog No. 200* shows you how and why. To get your free copy, simply mail the coupon.

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<input type="checkbox"/> SEAMED AND SEAMLESS METAL HOSE	<input type="checkbox"/> PRECISION BELLWS	<input type="checkbox"/> IGNITION HARNESS	<input type="checkbox"/> IGNITION SHIELDING		
					
<input type="checkbox"/> ELECTRICAL CONNECTORS	<input type="checkbox"/> RIGID AND FLEXIBLE WAVE GUIDES	<input type="checkbox"/> WIRING SYSTEMS	<input type="checkbox"/> FUSES		





Ponca City's NINTH Nordberg engine—a 12 cylinder two-cycle Duafuel® unit rated 5135 hp.

## 9th BIG NORDBERG DIESEL for PONCA CITY, OKLAHOMA



**"Ponca City has  
been TAX FREE for  
20 years...aided by  
Modern  
Diesel Power..."**

says Mr. PAT SCHLESINGER  
Plant Superintendent

• During the past ten years, the Ponca City Light Department has earned net profits approaching **FIVE MILLION DOLLARS**. These profits have financed all plant expansion and civic improvements and have paid practically all the costs of local government. Ponca City has been **TAX FREE** for the past 20 years.

The secret behind this impressive record lies in sound, efficient management and the reliable, low cost operation of Nordberg Diesel and Duafuel® power. With this successful background, it was natural that when Ponca City needed more power, officials again turned to Nordberg . . . and placed a repeat order for their NINTH engine . . . a new 5,135 hp Duafuel® unit which brings the total supplied capacity up to 22,660 horsepower—all Nordberg.

This is another good example of the way in which Nordberg engines are being used to solve scores of power problems efficiently and at low cost . . . for public and private utilities, and industry at large. Backed by engine building experience and service *second to none*, it will pay you to think of Nordberg when you think of power. Write for further information, outlining your power requirements. Nordberg Mfg. Co., Milwaukee, Wisconsin.



P154

*America's Largest Heavy Duty Engine Line—10 to over 10,000 H.P.*



The Los Angeles County Sewage Disposal Plant, generator room, located near Wilmington, California.

## WILMINGTON, CALIFORNIA SEWAGE DISPOSAL PLANT

### A Saga of Self-Sufficiency

By JAMES JOSEPH

**L**OS Angeles County Sanitation Districts' Joint Disposal plant comes close to being a perpetual motion operation. The Harbor City, Calif. plant is wholly self-sufficient, neither dependent upon outside sources for power, water or fuel. It generates fuel (sewage gas) to power engines which in turn drive generators, supplying the plant's electrical needs; it has a water well; it creates its own line pressure, sending primary effluent to final disposal in the Pacific via 7½ miles of tunnel and pipe line. And finally, a share of the plant's operational costs are paid from sale of fertilizer—a by-product.

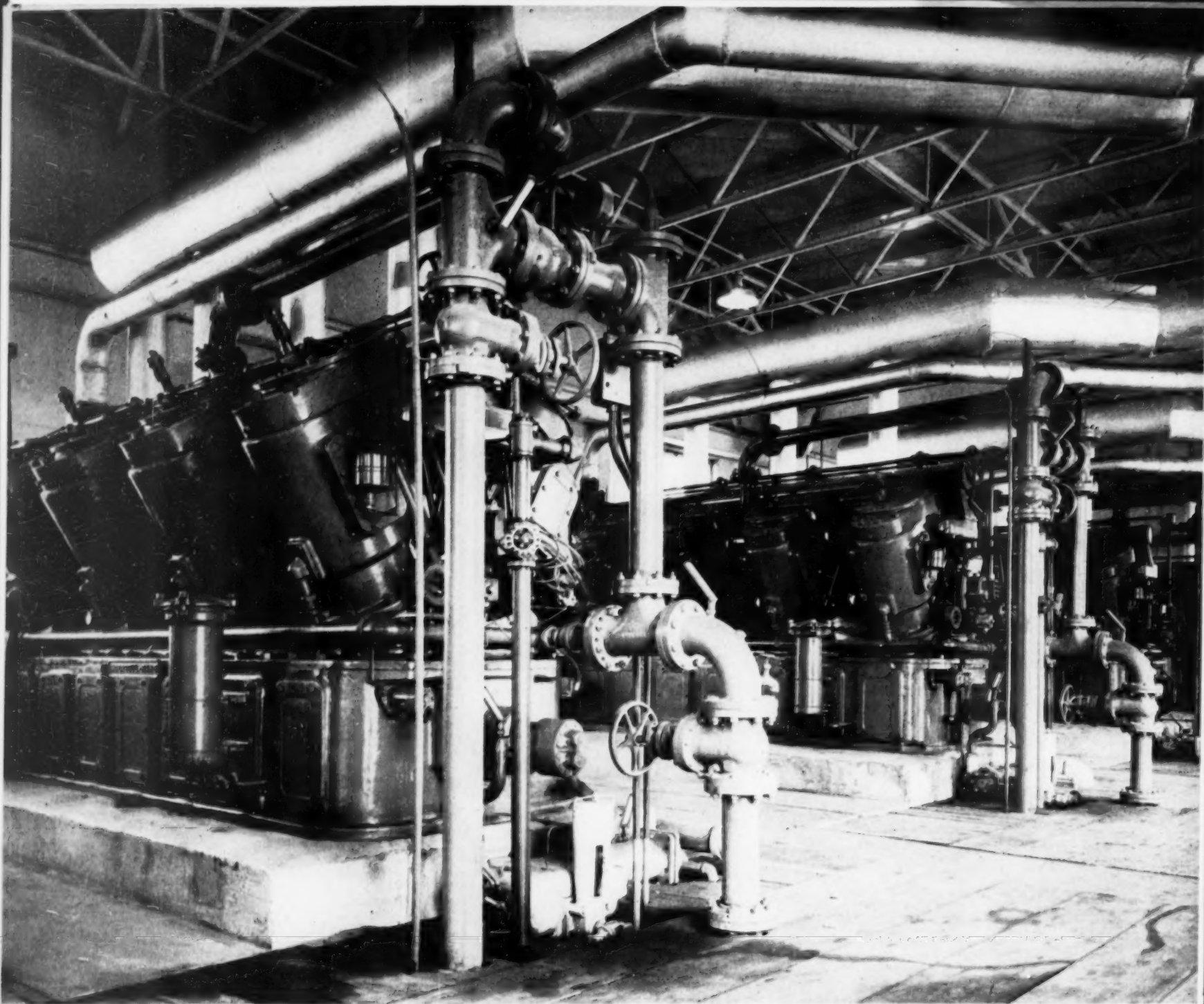
Recently, to handle increasing load, the Joint Disposal plant installed five Ingersoll-Rand PVG gas

engines, which not only operate on raw sewage gas, but also, gas lacking, on propane. The five 4-cycle gas engines each develop 408 hp., have 8 cylinders, and have a stroke of 13½, a bore of 11, and directly drive Peerless mixed-flow pumps via right angle (Western Gear Works) gearing. Impellers operate at a maximum 575 rpm., compared to the engines' maximum 400 rpm. Reason for the installation: to lift primary effluent a maximum 54 ft. in a surge tower (large concrete holding tank), from where it gravity flows through 8 and 12 ft. lines to the ocean. The 12 ft. line, currently being run 6 miles to the sea, will be completed next year.

Construction schedule for the 12-ft. tunnel pro-

vided for two cross connections to the existing 8-ft. line as the sections were completed. At the present time approx. 3 miles of 12 ft. tunnel are operating in parallel with the 8 ft. unit, carrying the plant's load to the ocean. And it's quite a load: some 175,000,000 gals./day. All this gallonage, of course, does not exit as primary effluent. Some—the solids—are digested to produce gas, then are dried and sold as fertilizer. Inherent self-sufficiency will be increased by the five new engines and a packaged engine-generator—the latter to operate jacket water cooling pumps should there be a power house failure. Defensewise, this is important. If an attack knocked out all power and fuel facilities in the LA area, the Joint Disposal plant would still be operative (al-





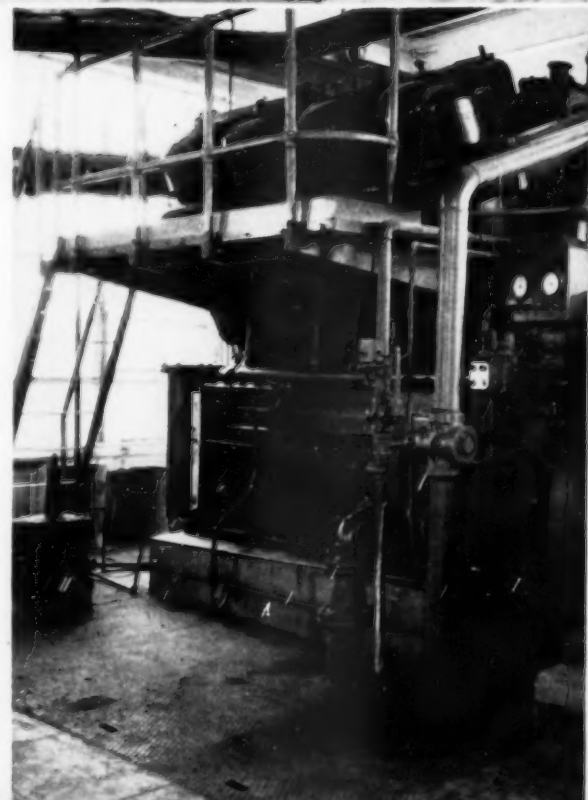
The five Ingersoll-Rand PVG engines in the pump house. Nugent filter in the foreground, Bosch magneto and Mercoid controls on top.

though admittedly some booster pumps up the line might be affected). And during any emergency, an area's health and thus its welfare is dependent upon continued sewage disposal.

But let's look at the operation, for it's a plant which other vulnerable municipalities have been eyeing with envy. Operations begin when raw sewage enters the plant via three lines: a primary 10 ft. 6 in. semi-elliptical main from the highly industrialized Compton and Lynwood areas; a 60-inch from the county's Bay cities; a 72-inch line from the eastern section of the county (Lakewood and Long Beach). Sewage is pumped into some 30 sedimentation tanks where solids sink, are removed to hoppers by wooden scrapers attached to continuous chain drives. Floatables are removed by a water spray. Together these two are termed raw sludge and they create the gas which fuels the plant. What's left, mostly liquid, is primary effluent, which

is raised to the surge tower, then sent by gravity to the sea. Sludge, both floatable and sedimentation, is pumped to conditioning tanks where it is heated to 90-100° F. by steam. Steam comes from a package boiler plant, installed in 1948, which likewise operates on sewage gas brought to the boiler house via an 8-inch main. Each boiler is fed through a 4-inch pressure regulated line.

Meantime, sludge, now heated, is pumped into large air-tight concrete tanks—"sludge digesters." There, bacteria reduce the organic matter, producing carbon dioxide, methane, inorganic residue and water. This gas fuels: (1) the boilers; (2) the power house and its 3 Ingersoll-Rand, "PKVG" 800 hp., 8-cylinder engines which are directly coupled to General Electric 560 kw. generators; (3) two Climax engines driving pumps in engine house #1—now seldom used; (4) the five newly installed Ingersoll-Rand units in engine house #2.





Ingersoll-Rand PVGs, fueled either by sewage gas or propane, have needed no modifications to adapt them to sludge gas analyzing (average):

Methane .....	67.5%
Carbon dioxide .....	32.4%
Nitrogen .....	0.041%
Carbon monoxide .....	0.03%
Hydrogen .....	0.02%
Oxygen .....	0.004%
Hydrogen sulfide .....	0.0043%
Ammonia .....	0.00025%

When, on rare occasions an industry dumps a bactericide into the sewer system, devastating the plant's gas-producing bacteria, the propane standby furnishes engine gas. The propane standby has an air mixing unit which provides 20,000 cu. ft. of 650 Btu. fuel, identical to sludge gas Btus. At the Los Angeles County Joint Disposal plant, this propane air-mix is fed directly into the top of digester tanks, from where, by the same lines which normally carry sludge gas, it is distributed to power units. Usually bacterial reactivation can be "started up" again in a matter of a day or two. The Ingersoll-Rand gas engines have a 7 to 1 compression ratio and are not derated for the low Btu. sewage gas. The effects of pre-ignition or auto ignition (knocking) are not experienced at full load and minimum speed. No attempt is made to remove the small amount of hydrogen sulfide present in the fuel and no acid corrosion is evident on cylinder liners and head gaskets.

Although many U. S. sewage plants employing primary sedimentation with separate sludge digestion run pump engines from the gas, only a handful (not over 40) generate electrical power as well. The plant's new pump house with its gas-fueled

engines is uniquely self-sufficient. The five Ingersoll-Rand PVG engines and the pump house are 23-ft. above sea level. Engines are cooled through five banks of fin-tubed coolers. Unlike many engine-cooling radiators, these are mounted horizontally outside and some distance from the pump house. Four Moore axial-flow, top-mounted fans aerate the radiators. A standpipe and float in the system's return line, provide necessary make-up water, although only minimum water loss is experienced. Engines are maintained at about 190 degrees F. This prevents sweating, particularly in water-jacketed cylinders which are constantly warmed even when engines are shutdown, to prevent corrosion endemic to sewage gas operation. Each engine's water jacket has an immersion heater (Calrod) in the incoming side of the line, a thermostat in the outgoing. And the entire system for all engines is circulated by two Peerless pumps, directly coupled to 25 hp. U. S. motors.

It is this cooling system—really a "heating" system—which is essential to sewage fuel operation. And because it is, it's protected by a gasoline fueled engine-generator set. Thus, should the plant's own sludge gas facilities be knocked out by anti-bacterial sewage, the pump house's engine cooling system will still be operative (so will the engines, since they can run on propane). This stand-by electrical plant, for pump house use only, consists of a Waukesha engine (140 hp.) driving a Delco ac. generator, producing 60 kw. at 1800 rpm. The Waukesha is battery-started. Another interesting feature is the PVGs' governing. Governors control engine rpm. from full (450 rpm.) to one-half (225 rpm.), thus the rpms. of their respective impellers, thus the gpm. flow rate into the surge tower. While one Ingersoll-Rand is experimentally equipped with a clutch for engine starting, this was found unneces-



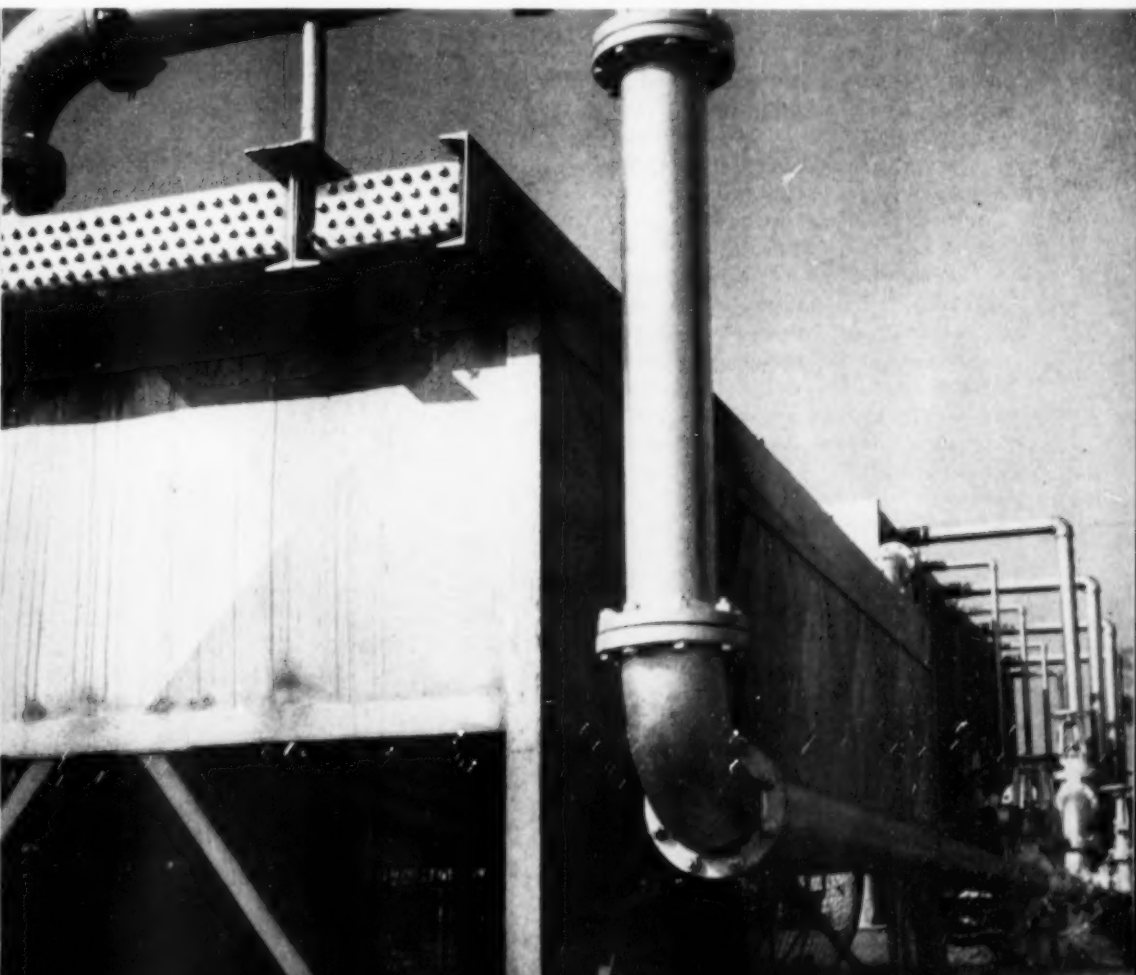
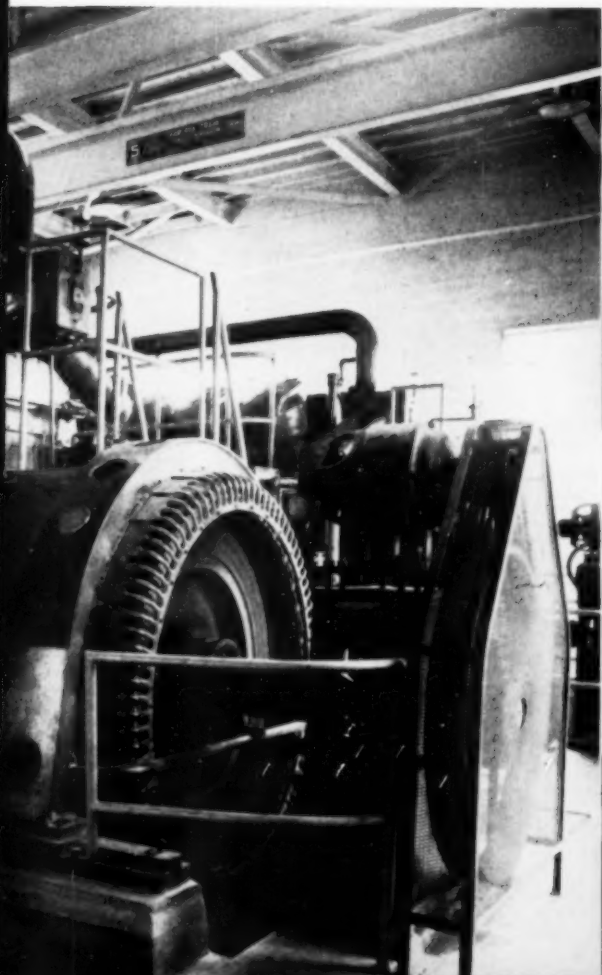
L. R. Wright, plant superintendent of the Los Angeles County Sewage Disposal Plant.

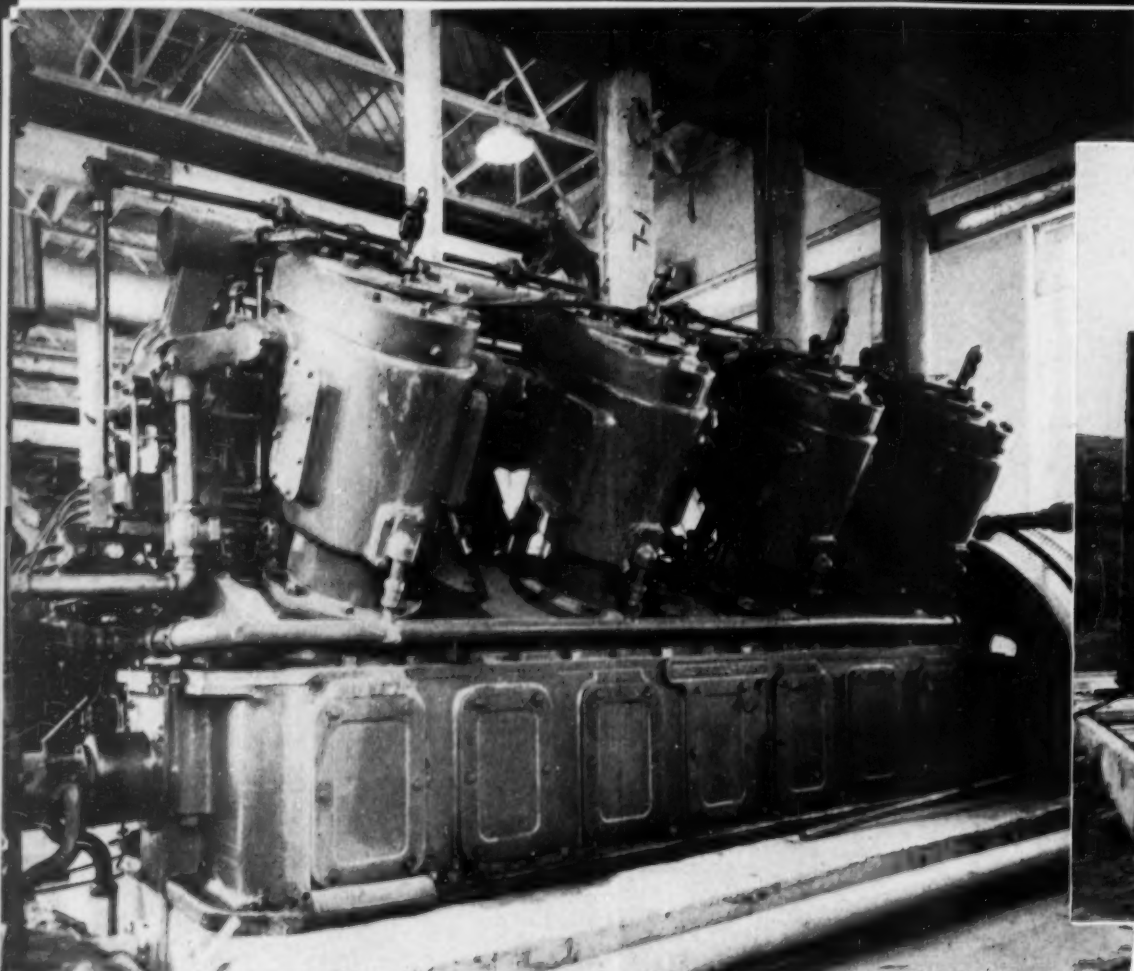
sary. So engines, coupled to impellers, are started up under partial load.

Governors can be remotely controlled from a central panel or from a local engine panel (most frequently the case). These Type UG8 Woodward governors regulate a mixing valve on each engine's gas-air chamber. Air, pulled into the compartment by the engine at 4-inch water vacuum, is first cleansed through oil filters mounted outside the building. Sewage sludge gas is supplied to the gas-air chamber at 2-inch water pressure, the Woodward-controlled valve setting the mix to predetermined speed and hp. In practice, then, rpms. are pre-set according to the desired gpm. of primary effluent. Air starting is another engine feature. There are two air tanks (250 psi. maximum). When an engine is started up, the operator pulls an

Generator end of the Ingersoll Rand engines. Note the Pickering governor which regulates the air-gas chamber mix and the rpm.

The Fintube outdoor horizontal cooling unit for the main power house.





Close-up view of the cylinder tops of the PVG engines, with air start mechanism. Note exhaust piping, incoming sewage gas (center pipe) and water jacket cooling system with thermostatic control (left).

"air" handle. Air, at about 250 psi., turns the cylinders. It then opens the gas line. Gas is ignited by magnetos, and once an engine is firing, air is shut off and the engine operates on gas. Air compressors are electric-powered from the power house. They can also be rigged to the standby engine.

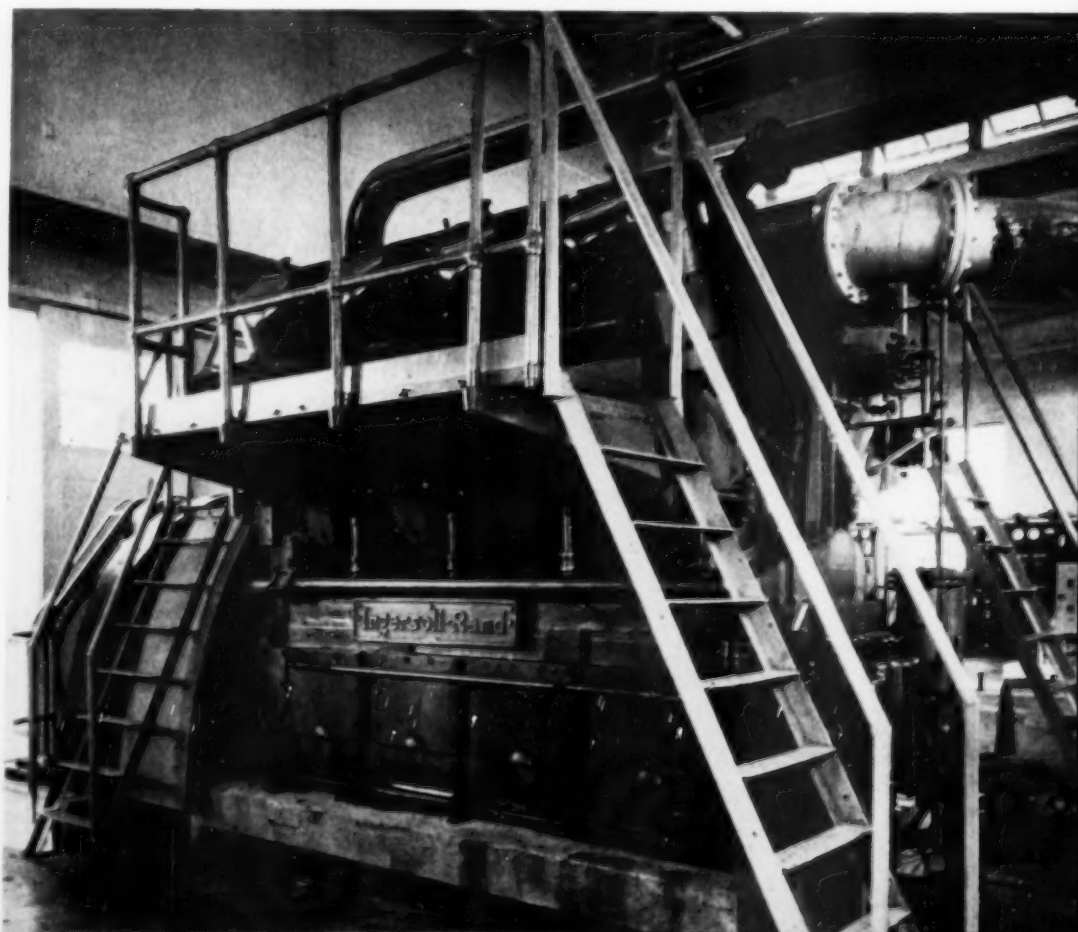
The same system used for engine water jackets cools lube oil heat exchangers (Ingersoll-Rand). Lube oil normally runs about 105-degrees F. and is filtered in a built-in (Nugent) filter. Lube oil is circulated by an engine-run pump, through the exchanger, then back to the crankshaft. Each engine has an Ingersoll-Rand gear pump, driven off the engine. Normally all engines are run at the same speed, operating pumps over the proper range on their characteristic curves. Pump speeds are varied as required by plant flow. Pumping is required from about 2 p.m. through the night, until about 6 a.m. During wet weather all engines must run continuously as the thousands of manholes on miles of sewer lines in Los Angeles County have two one-inch air holes, maintaining peak load with the flow of rainwater. The plant's power house is also interesting. There, two 800 hp. Ingersoll-Rand sludge gas fueled PKVG engines are being supplemented by a third identical engine. One engine was installed in 1946, another in 1948 and the third will become operative early this year. For nearly five years the original engines have been almost constantly running. Now, with expansion, need for more electricity and for a standby unit have necessitated the new engine.

Just as with the pump house units, power house engines operate on sewage gas or propane, standby. Their GE 560 kw. generators are synchronized to

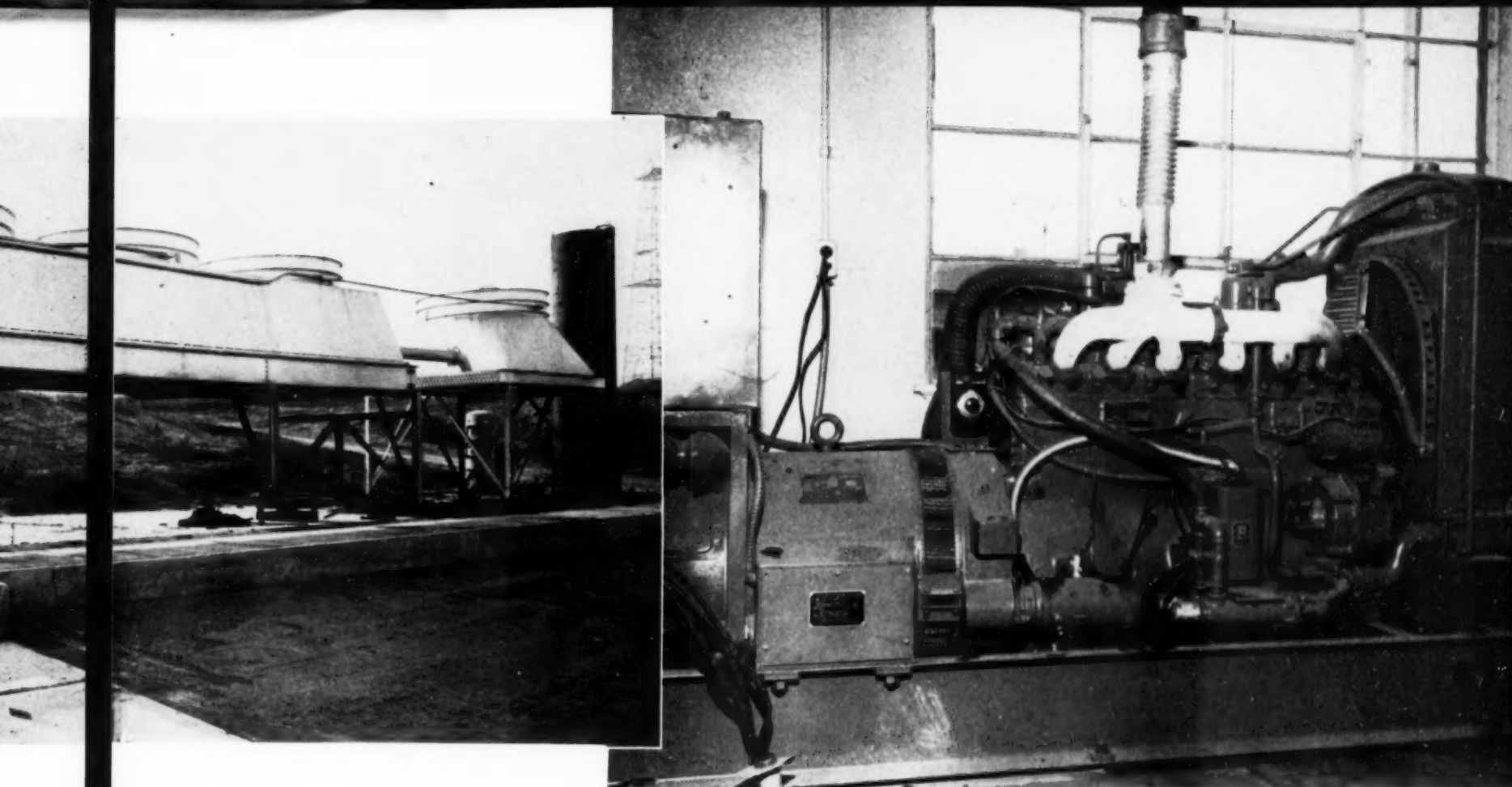
produce 480 volts, 60 cycle and must, by necessity, run at constant speed. Working together they produce 1200 kw., governed from a central control board. Each engine has its own panel section which shows "bearings-cooler oil pressure," "rpm.," "manifold pressure—left bank, right bank." There's also

a kwh. meter indicating output of each generator, a Westinghouse Silverstat regulator and sync light. Air-gas mixing is similar to the pump house operation. Incoming air is filtered by a Cycoil oil bath type filter. Cooling systems for water jackets include a bank of vertical tube-fin coolers, fan-actuated, and a bank of horizontal radiators, with three fans.

One of the generator engines showing Cuno filter in front foreground and Nugent filter behind, also Rockwell gas regulator.

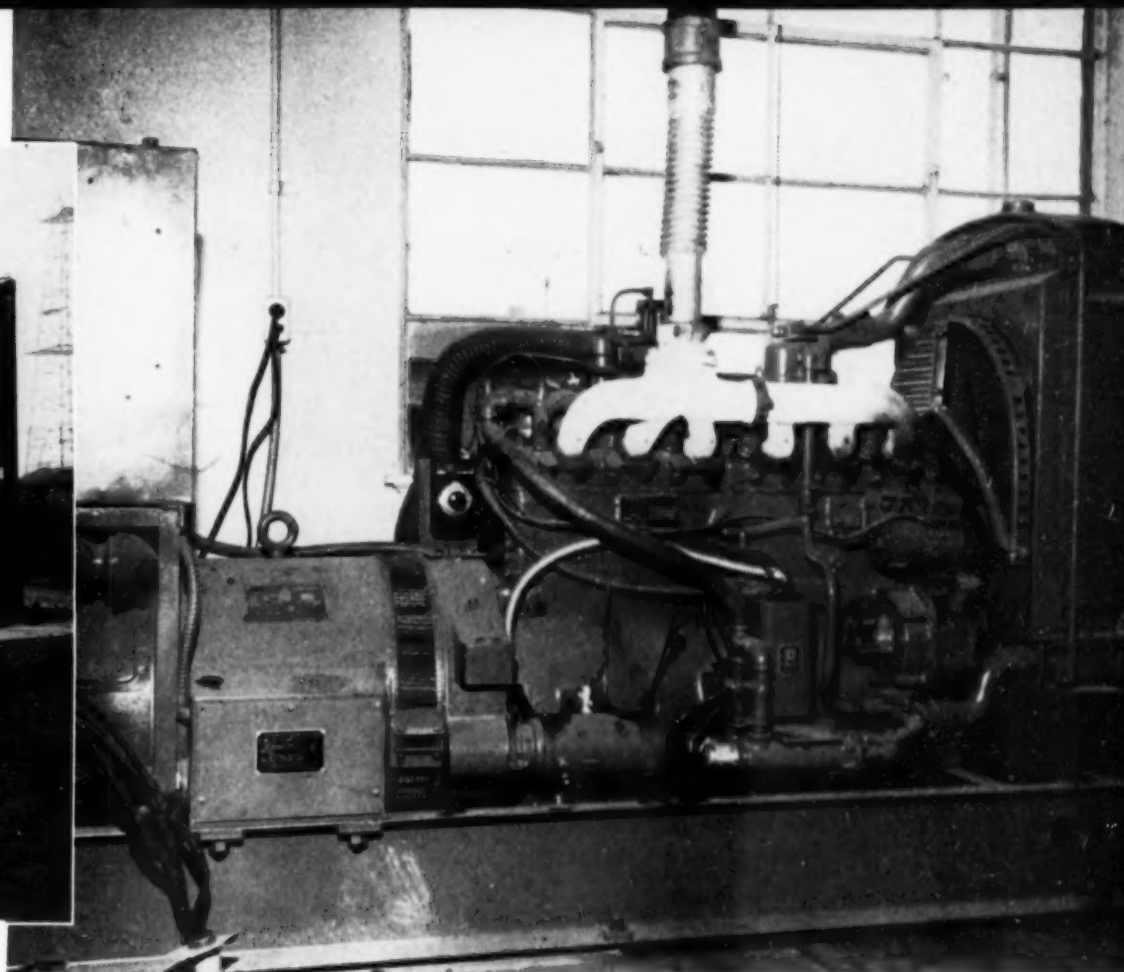






Says L. R. Wright, plant superintendent. "We're going to be even more self-sufficient around here." He means, of course, installation of the plant's third power house engine and new additions to the pumping station. This then, is a saga of self-sufficiency—and a good one. A M Rawn is chief engineer and general manager of the sanitation districts.

Exterior of pump house showing Maxim silencers and Vortex air filters.



The Waukesha electric generating set for emergency lighting is always kept hot for immediate starting.

### List of Equipment

#### Pumping Plant

1. Engines—Ingersoll-Rand Model PVG gas engines; bore 11-in., stroke 13½-in., 408 bhp., 400 rpm.

2. Vortex Air Cleaners.
3. American Bosch magnetos and ignition equipment.
4. Nugent and Cuno lube oil filters.
5. Woodward governors.
6. Weston tachometer.
7. Pacific Western right angle vertical pump drive.
8. Taylor thermometers.
9. Maxim mufflers.
10. Fintube jacket water cooling towers.
11. Worthington gas compressor.
12. Ingersoll-Rand heat exchangers.
13. Taylor even action valve.
14. Waukesha auxiliary stand-by engine generator set for emergency lighting.
  - a. Waukesha Model 110 GZB gas or gasoline engine.
  - b. Delco 60 kw. ac. generator.
  - c. Delco-Remy Model 12 electric starter.
15. Rockwell gas regulators.
16. Temperature jacket water Mercoid controlled.

#### Generating Plant

1. Engines—Ingersoll-Rand Model PKVG gas engines; bore 15¼-in., stroke 18-in., 800 bhp., 327 rpm.
2. American Air Filter Cycoil oil bath air filters.
3. American Bosch magnetos and ignition equipment.
4. Nugent and Cuno lube oil filters.
5. Pickering isochronous governors.
6. Rockwell gas regulators.
7. Reliance tachometer.
8. Maxim mufflers.
9. Fintube jacket water cooling tower.
10. Generators: GE 560 kw. 60 cycle ac.
11. Temperature jacket water Mercoid controlled.



# M/V "MOKUHANA"

By CHAS. F. A. MANN

**C**OMPLETED near the year-end by Albina Engine & Machine Works of Portland, the trim all-steel San Francisco Bay sugar boat *Mokuhana* went down the coast under her own power and is presently serving the Bay sugar refineries. The transporting of sugar from the refineries at Crockett, California to San Francisco is the full time job of the new diesel ship. This trim shallow draft river boat is owned by the Bay & River Navigation Co., Pier One, San Francisco. Working closely with President David Penhallow and Manager of Operations, C. E. Luddy, Naval Architect L. C. Norgaard produced the design for this revolutionary cargo vessel.

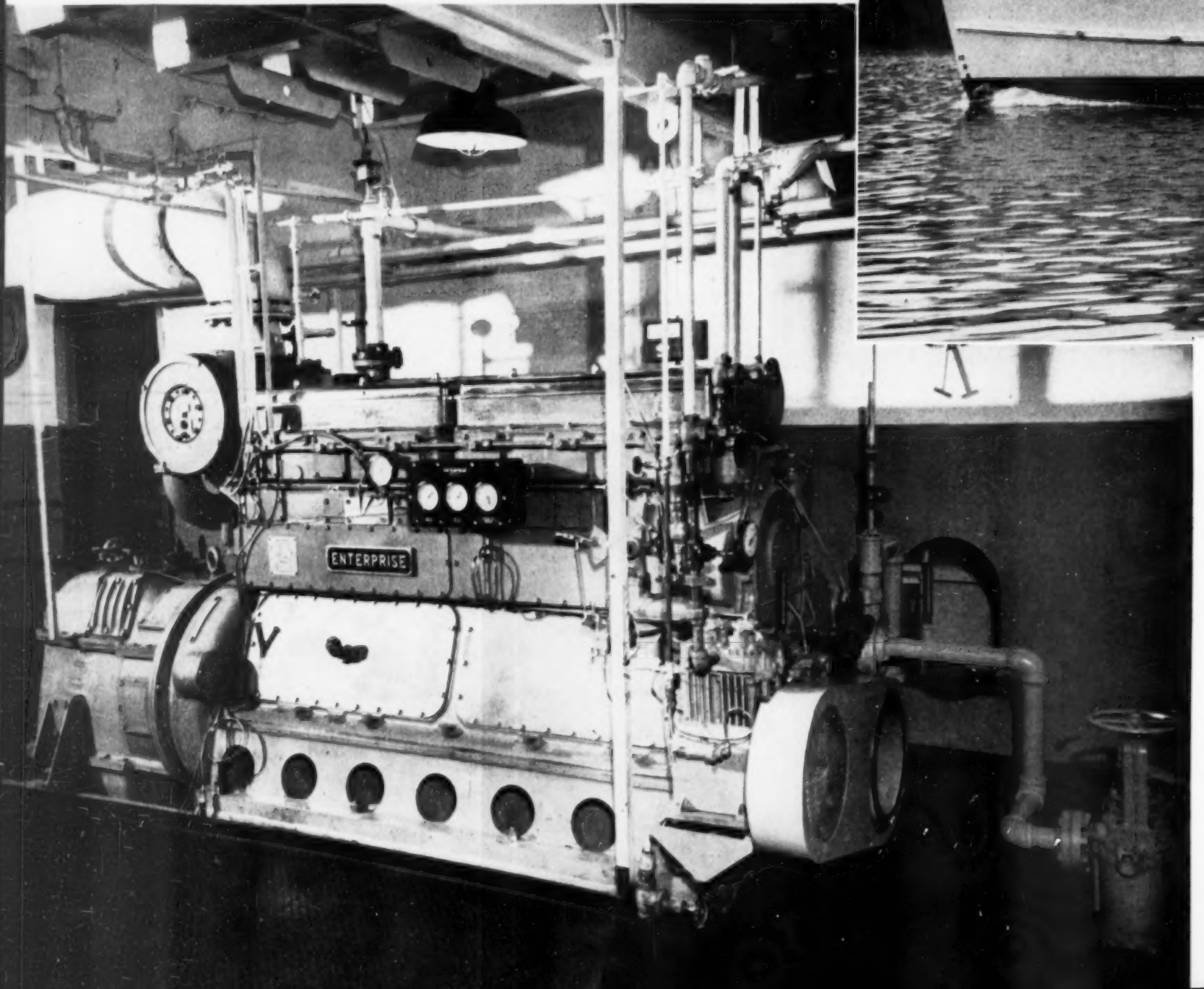
Early in the development, a mock-up was constructed in a 1/4 in. scale with details of the finished

craft. Following this, a scale model was built and tested at the University of California to confirm the unique hull design. During the period of testing, Mr. Norgaard added twin skegs which have produced an unusually clean flow line with minimum resistance in travel. It is important in the *Mokuhana*, due to her cargo, that the vessel have extreme stability. This has been achieved by correct hull design.

Construction of the *Mokuhana* was completed in late December 1953 by Albina Engine & Machine Works of Portland, Oregon. This hull 288 is 178 ft. long with a 36 ft. beam with a 12 ft. depth at the main deck. Following her launching, the *Mokuhana* made the somewhat perilous ocean voyage from Portland to San Francisco in record speed of

Port engine of the M/V *Mokuhana* is an opposite twin of the starboard engine. Both are Enterprise DMM-36 driving twin screws through Western Gear Works 2:1 reduction gears. Turbocharging is by Brown Boveri.

24





The M/V *Mokuhana* during her trials on the Willamette River. Notice the smooth, clean lines of the vessel.

just under 11 knots. No difficulties were encountered; and this glistening new white and blue cargo vessel arrived at her San Francisco pier one just a few minutes ahead of schedule on December 15th of last year.

Another unusual feature of the *Mokuhana* is the elevator system for loading pallets of sugar. The elevator runs the full width of the vessel and is accessible to docks through 23 ft. roller steel doors on both port and starboard. The elevator is operated by a hydraulic ram mechanism with power transfer through cables and sheaves. The system of loading direct on to the elevator from the dock at an even level has greatly speeded up the loading operation. In practice four fork trucks are generally used, two of them loading while two others move on to the elevator platform, which is relocated then at the cargo level with one fork truck loading to the stern and the other one forward. By this efficient system, it is possible to load the full 600 ton capacity in a minimum of time, permitting the *Mokuhana* to make the complete round trip, loading to unloading, with a much shorter turn-around time. This makes it possible to load and unload

within the day, permitting the crew to be on shore every night. The freight deck is unobstructed for the full length and beam of the vessel and is protected from fire by a fixed CO<sub>2</sub> system.

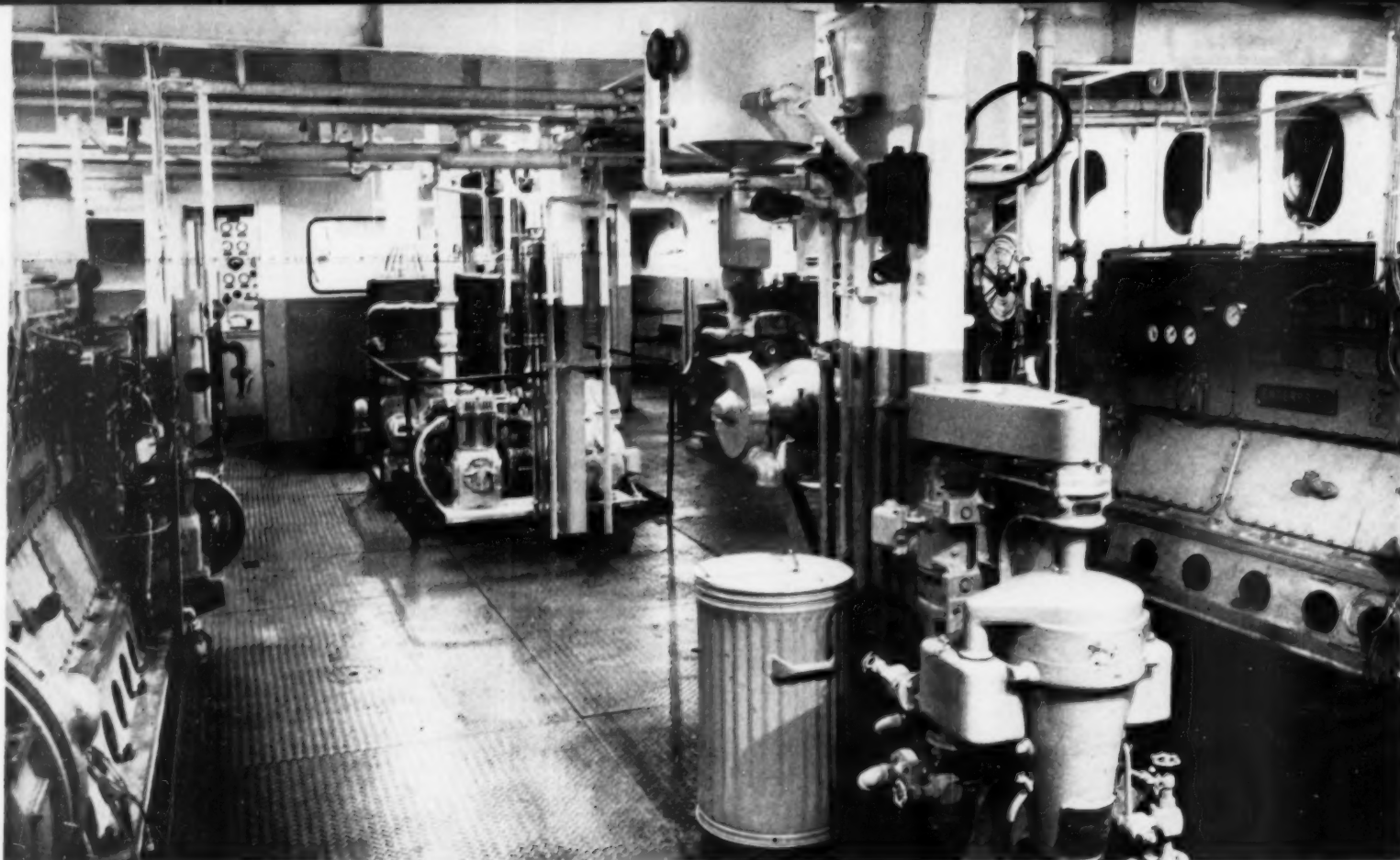
The engine room of the *Mokuhana* is a model of efficient arrangement with adequate space for maintenance and service, powered by two true right and left hand port and starboard Enterprise engines operating 400 bhp. at 800 rpm., turning twin screws through 2:1 Western Gear Works reduction gears. Both of the diesel engines feature Brown Boveri turbochargers.

As an added comfort for the crew, a sound-proofed control room houses the Columbia switchboard on which are mounted the Adel (General Metals) hydraulic remote controls which operate the engine. Signals are received from the pilot house on the electric engine order telegraph. This system, in conjunction with the fast responding Enterprise engines, makes it possible to achieve the close maneuvering necessary in docking the *Mokuhana*. Auxiliary power is supplied by two General Motors 6-71 diesel engines, direct connected to Kurz and

Root 50 kw., dc. generators. Connected through a clutch on the ends of these units are the TMG-8B Denison hydraulic pumps which supply power to operate the elevator ram. All the hydraulic gear and compressors are centrally located to conserve space and to facilitate maintenance. Throughout the *Mokuhana* there is much evidence of advanced planning in centralizing controls, lines and other gear, giving the vessel the added appearance of great space due to this cleanliness of design.

Top side of the *Mokuhana* looks almost like a pleasure craft due to its trim lines and over-all appearance of cleanliness and space. In the amply proportioned pilot house is every navigational need, including a Sperry steering stand, Radiomarine CR-103 radar, compass and binnacle, Twin Bendix electric engine order telegraphs, Weston shaft rpm. and direction indicators and rudder angle indicator. A chart table and upholstered settee is installed in the after end. Hose-McCann telephones are used throughout the vessel. Visibility from the pilot house is unobstructed. All glass is mounted in rubber channels. This system is somewhat new in work boat use, but provides efficient





The engine room of the *Mokuhana* showing the two Enterprise diesels, the hydraulic and pump section in center background and the enclosed control room in rear. Note the Quincy compressor. The GM auxiliaries are also visible. Sharples fuel oil centrifuge in foreground. Fuel injection equipment consists of Bendix pumps and Bosch nozzles.



In the ship's wheelhouse, left to right, David Penhallow, president, Bay & River Navigation Co.; Capt. S. G. King who brought the ship down on her maiden voyage; Capt. W. B. Atthowe, Bay & River Navigation Co., San Francisco; C. E. Luddy, operations manager of the Bay & River; L. C. Norgaard, naval architect and designer of the ship; and Capt. J. H. Berendsen, Matson Port Captain.

Chief engineer Manuel Purdy operating the Adel hydraulic remote controls in the soundproof operating room. This control station in the engine room contains main electric switchboard, main engine control panel with all gauges and instruments for both engines, including Adel remote hydraulic controls, engine order telegraph and Weston tachometers.



protection against weather. The rubber mounting takes up any shock and makes for easier replacement in the event of damaged glass.

Crew quarters, dining saloon and galley are all equipped in almost luxury class. Following the pattern established by Bay & River Navigation Co., the name selected, *Mokuhana*, is an Hawaiian word meaning "work boat."

#### List of Equipment

Main Engines—Two Enterprise DMM-36 diesels developing 400 bhp. at 800 rpm., true right and left hand with controls inboard.

Governors—Woodward.

Fuel pumps—Bendix.

Fuel nozzles—Bosch.

Reduction gears—Western Gear Works.

Turbochargers—Brown Boveri.

Auxiliary engines—Two General Motors Model 6-71.

Generators—Kurtz & Root.

Engine hydraulic controls—Adel (General Metals).

Switch and instrument board—Columbia.

Fuel oil transfer pump—Westco.

Fresh water pump—Westco.

Air compressors—Quincy.

Bilge pumps—Fairbanks-Morse.

Fire pumps—Fairbanks-Morse.

Lube oil centrifuge—Sharples.

Tachometers—Weston.

Fuel oil filter—Purolator.

Lube oil filter—Purolator.

Fuel tank liquid level—Liquidometer.



## MAINTAINING ESSENTIAL COMMUNICATIONS

By C. S. DUNN\*

**M**AINTENANCE of communications in the event of a national disaster remains the chief concern of the public authorities. The importance of maintaining a supply of power for all essential requirements cannot be underestimated. In order to efficiently shift personnel and equipment to needed areas with the least possible delay, communications must be maintained. Quick as-

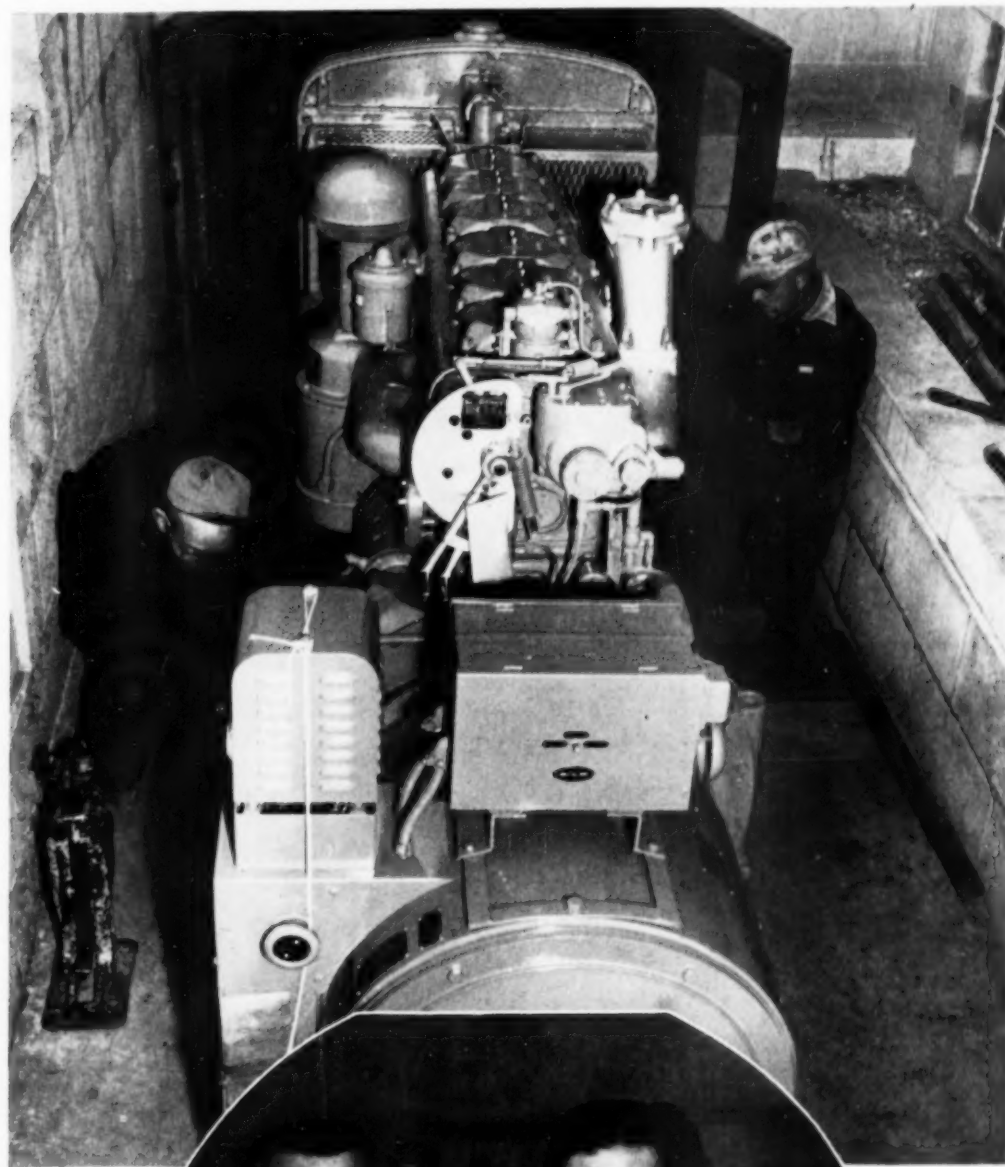
\*Police Communications Officer, Tulsa, Oklahoma.

sistance is the main feature in saving lives. To maintain essential communications in the face of disaster requires an independent power source. A central electric generating plant, while the most efficient source of power for a community in ordinary times, becomes highly vulnerable under extraordinary situations.

Failure on the part of the central generating plant

generally means almost complete paralysis of the community. The installation of emergency generating sets forestalls such paralysis. It is to meet just such eventualities that a diesel generating unit has been installed in the basement of the police station at Tulsa, Oklahoma. It is the first auxiliary generator put in a police station in this state. This stand-by unit is for an emergency in case the police radio is shut down by power failure due to bomb attack, cyclone or any other such disaster.

The skid mounted Murphy diesel generating set installed in the Tulsa, Oklahoma police station.



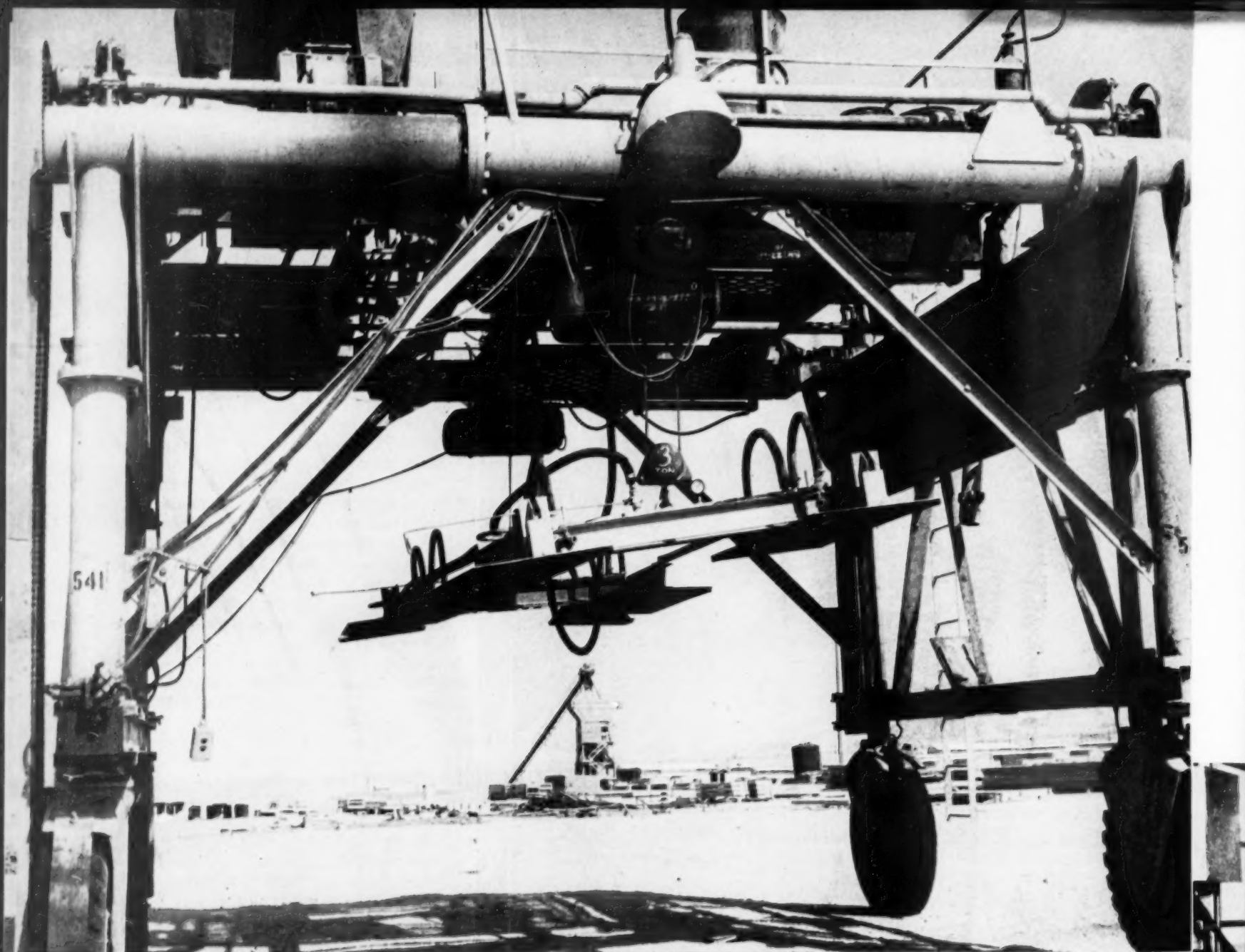
Radio communication is assured when it is needed most. In the past, due to severe local electrical storms, power has been cut off just when there is the greatest demand for the police radio. Cooperating with the city in the purchase of the generator was the Office of Civil Defense, which in case of emergency will share the radio with the police. Only a direct bomb hit could destroy the generator room as the roof and walls of the room are of foot thick concrete laced with multiple steel reinforcement rods.

The 150-horsepower Murphy unit was chosen due to the fact that once local power is cut off a Delco 24 volt starting motor takes over and within ten seconds the engine can be up to rated capacity carrying the full connected load. This unit is radiator cooled, skid mounted, has a 110 gallon fuel tank and a bore and stroke of 5 3/4 x 6 1/2. Contained in this unit are Murphy Micro-Hydraulic controls, Donaldson air cleaner, Maxim exhaust silencer, Synchro-Start automatic starting controls and Asco automatic transfer switch. Piston rings of the engine are Koppers and it will operate with Kendall 20W lube oil. Batteries are Willard and the flexible coupling, Thomas.

The generator is an Electric Machinery Co. packaged type, direct connected, single bearing, 100 kw., 240 volt, 3 phase, 60 cycle, 4 wire machine equipped with a direct connected E-M exciter. This engine-driven generator provides the emergency power for the police station radio equipment, crime laboratory equipment, lights, etc. Police departments over the nation favor the diesel electric stand-by units because they are self-supplied, being completely independent of all outside sources of fuel, etc. The unit is located directly under the cell block with the exhaust leading outside the building. One of the prime advantages realized in the selection of the diesel engine is the non-toxic characteristics of the exhaust gases.

The Tulsa station with all electrical equipment turned on normally consumes 80 kw., thus this unit gives a safe operating reserve. Officials hope that the new installation will never have to be used but it is their job to be prepared along with the Office of Civil Defense in case the unit is needed for any disaster man-made or of nature.

◀ Right: C. S. Dunn, author of this article and Ray Haley of the Murphy Diesel Company with the Murphy generating set in the background.



Partial view of the new Marine Base as seen through a uniquely designed straddle-type lumber carrier which, vacuum equipped, lifted the camp's pre-cast concrete slabbing into place. A small diesel engine powers lifting devices.

## MARINE CORPS DIESEL PIPELINE

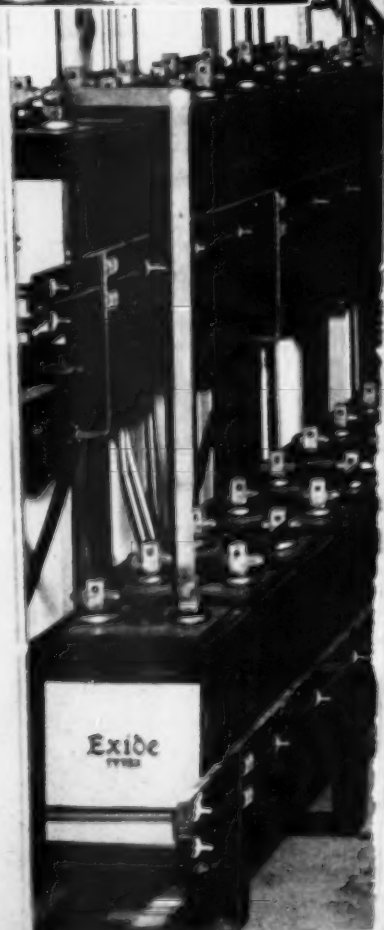
By JAMES JOSEPH

**T**HREE diesel pumping stations, along a 14-mile, 18-inch diameter concrete steel-cylinder pipe line, will furnish water to what is being heralded as the Marine Corps' newest training base. More important, perhaps, dieselization is saving taxpayers thousands of dollars every year. Here's how: the big base, stretching over 564,000 arid acres of the Mojave desert near Twenty Nine Palms, Calif., has a major water problem. When completed the camp—dubbed Marine Corps Artillery Training Center—will house about 8,500 men. But the requirements for long range artillery necessitated a desert location. This in turn brought up the problem of water, always acute in the Mojave.

The architects and engineers for the project, Neptune and Gregory, of Pasadena, Calif., originally

believed that it would be necessary to lay pipes some 35 miles to connect with the nearest Metropolitan Aqueduct which totes Colorado River water to the Los Angeles area. But extensive geological-hydrological investigation and testing discovered sufficient water in three locations, the farthest but 14 miles from the campsite. For beneath the desert lie a number of natural underground water storage basins. Thus, the Marine Corps' Artillery Training Center will be wholly self-sufficient, requiring no outside water supply. Militarily, this is important. Water, carried in the 18-inch conduit, will feed two 1,000,000 gallon storage tanks installed above the camp. These will gravity feed to the camp water distribution system.

Several test wells and three supply wells were



DIESEL PROGRESS



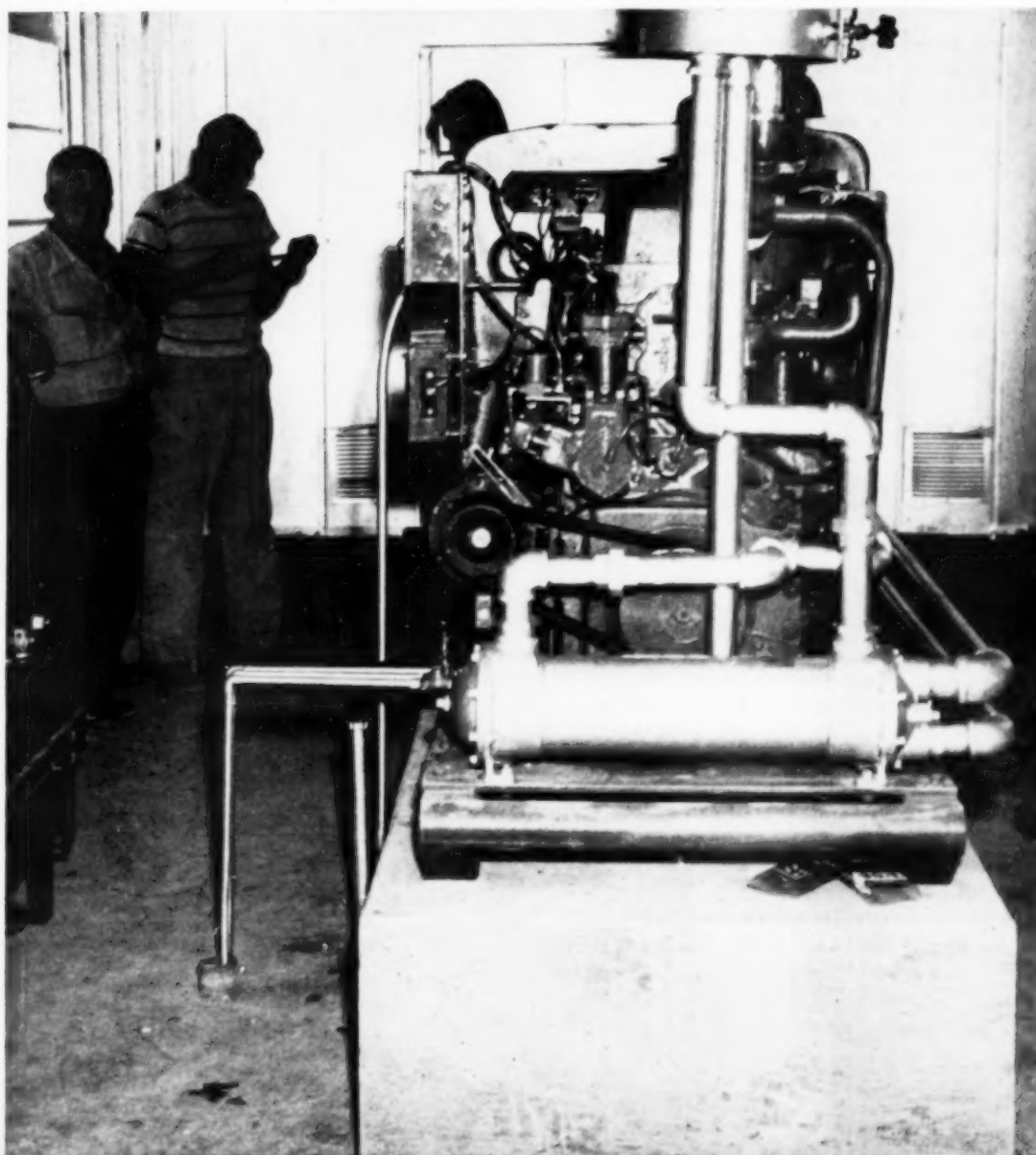
drilled. They'll supply water continuously, saving some \$1,000,000 in pipe line construction costs, plus huge additional savings because the government will not have to purchase water. This cost-cutting alone has helped to hold the installation's cost to about \$13,000,000, including roadways, buildings and other facilities. For the first time in military construction, precast concrete slabs were poured for a majority of the structures. Precasting cut barracks construction costs to a minimum.

But behind the camp's water self-sufficiency is dieselization. Although security does not allow pinpointing the wells' exact locations, the part diesels will play is no secret. The Marine Corps wanted diesel pumping stations which would be almost wholly automatic. Furthermore, they were required to be equipped with automatic shutoffs in case of engine overheating or high line excess pressures. Each pumping facility contains an oil-lubricated Fairbanks-Morse deep well turbine pump capable of 870 gpm. at 1750 rpm., at pumping head levels varying between 355- and 95-ft. Pumps are rigged with right angle gear drives of 11½ to 1 ratio and directly driven by Fairbanks Morse model 4944½ diesel engines through flexible couplings. Pump house #1 has a two cylinder diesel engine, with a continuous bhp. (at 1400 rpm.) of 45, a total displacement of 174 cu. inches. The turbine pump is a 7-stage unit, 12-inch dia. and operates as do all the pumps, at 1750 rpm. Bores and strokes

of all three engines are identical 4.5 x 5.5. Pump house #2's diesel engine has four cylinders and is rated 90 hp. It drives a 12-inch, three stage turbine pump. Pump house #3 is equipped with a 6 cylinder diesel engine, rated 132 hp. with a total displacement of 522 cu. inches. Displacement of #2's engine is 348 cu. inches. All three locations have 32 volt storage batteries for engine start-up.

Typically, an engine drives a turbine pump's right-angle drive through a flexible coupling. The out-go end of the pump connects to the main line through an 8-inch bellows-type flexible coupling. At each pump site there's a 1000-gallon underground diesel fuel oil storage tank, the fuel being trucked in. Heat posed problems. You have to live in the sweltering Mojave to appreciate what local people call "the monotony of heat." For 120 degrees F. in summer is usual, and a daily occurrence. Thus engine cooling was primely important. Actually, while cooling was a problem close-at-hand water in large quantities made solution simple. Specifications required that each engine have a built-in centrifugal jacket-water circulating pump, and that the exchanger's bronze shell and admiralty metal tubes be large enough to maintain engines at the manufacturer's normal full-load operating temperatures—regardless of outside weather conditions. Cooling was predicated upon well water temperature not to exceed 95-degrees F. In action, well water circulates through each engine's radiator, then is wasted

One of the Fairbanks-Morse Model 4944½ diesels in a typical interior of one of the base's three pump stations scattered far into the desert. Note storage batteries for start up.



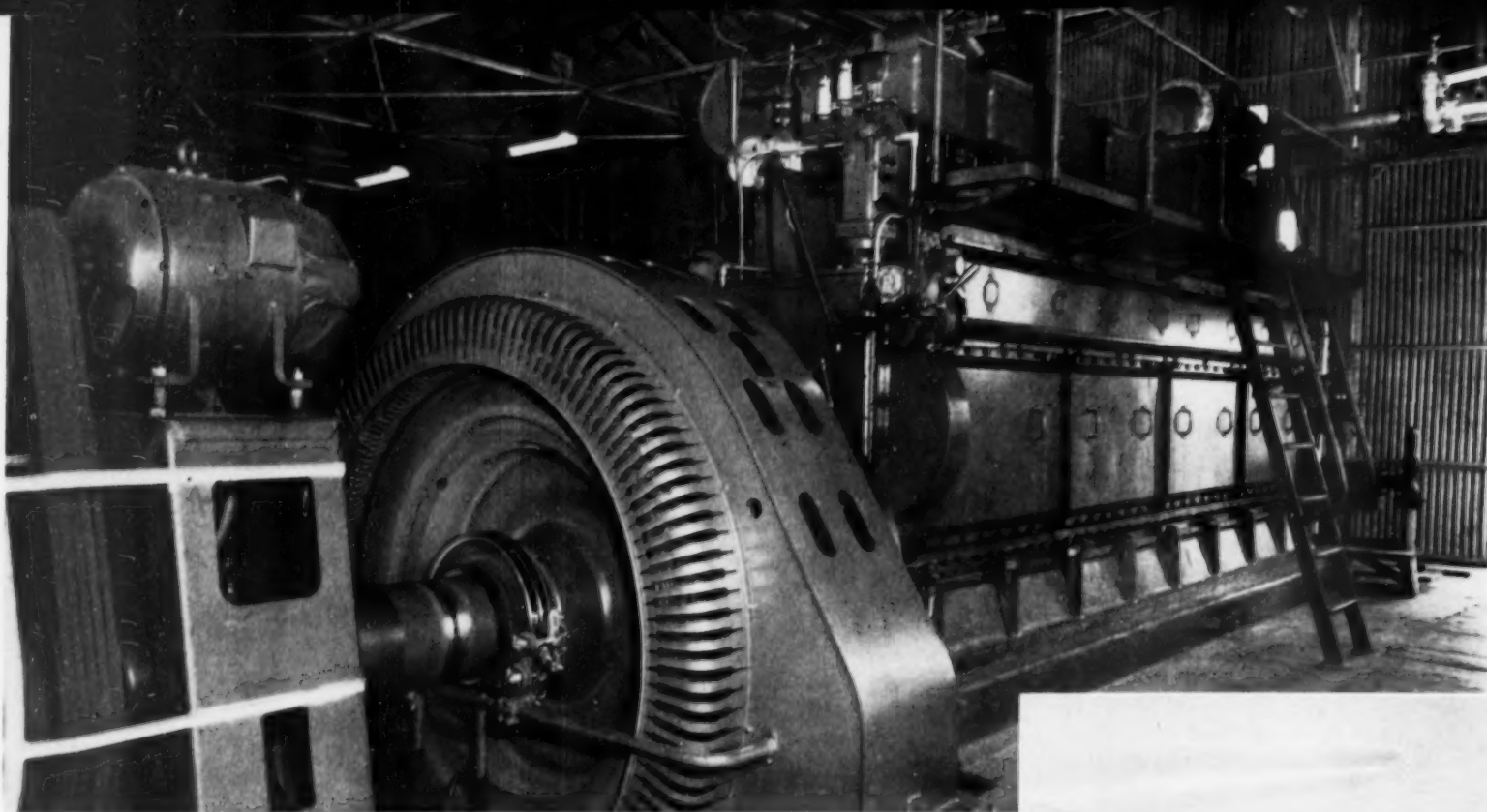
A dieselized crane lifts concrete bucket to top of slabbing on the Marine Base's theatre building.

back into the well. Thermostatic controls maintain jacket water temperatures at required engine operating temperatures.

Pumping units are also rigged with automatic shut-down controls, which shut the engine down at pre-determined pipe line pressures. Once shut-down, start-up is manual. Shut-off is accomplished through a mercury-type pressure switch installed in the 8-inch pipe on the discharge side of the check valves. Switch range is between 5 and 150 lbs., with a maximum working pressure of 175 psi. After the timer contacts close, a solenoid valve in the lube oil feed line to the engine's governor is energized, stopping the engine. Shut-down controls are mounted in a special control panel in each pump house. Each engine and each pump station is separately controlled. The turbine pumps are also self-lubing. A built-in lubricating oil pump impeller is mounted on the vertical shaft below the lower bearing housing. This pump delivers a constant supply of lube oil under pressure to gears and bearings. A water jacket surrounds the oil reservoir, preventing excessive lube oil temperatures. Both engines and turbines were required to operate within a temperature range of from 30 to 125-degrees F. Even though the new wells and pipeline will furnish an ample supply of water, the camp is designed for maximum water conservation and re-use. Non-potable water, for example, will be pumped from the sewage plant to operate toilets.

The Training Center is being built for the Marine Corps by the Navy's Bureau of Yards and Docks, with Captain K. A. Godwin, District Public Works Officer of the Eleventh Naval District as Officer in Charge of Construction. The construction of the Center is being accomplished under a joint venture contract with Ford J. Twatts-Morrison Knudsen-Macco construction companies. N. P. Van Valkenburgh Co., South Gate, Calif., laid the 18-miles of pipe line.





Largest and newest of Farmington's prime movers is this Worthington high-compression natural gas engine, rated at 1,525 hp. at the plant's 5,280-ft. elevation. This view also shows the Electric Machinery generator and the Woodward governor.

The Animas plant was constructed swiftly by the Town of Farmington, New Mexico, to keep up with a rapidly rising load. Built in 1949, it now uses four gas engines.



**F**ARMINGTON was fabulous even before it happened. With a population of just 2,500 it was the trading center for vast San Juan County, 5,515 square miles of Northwest New Mexico. This is the land of the Navajo and the Ute, whose reservations occupy half the county. Elk, deer, antelope and bear range this high plateau with altitude of 4,800 to 5,700 ft. Fish abound in the La Plata, Los Animas and San Juan Rivers. The spacious county has ample room for both the primitive and the civilized. More than 50,000 irrigated acres yield crops of corn, wheat, potatoes and pinto beans; here are orchards of apples, peaches, apricots and cherries. The ranches ship as many as 50,000 lambs and 10,000 head of cattle all over these United States in a single year.

Then came the boom. Rich oil and natural gas fields were discovered close to Farmington. Modern prospectors with Geiger counters found uranium in the county. Within five years, great pipelines were carrying gas from Farmington south to Albuquerque and Santa Fe, and west to California. The prosperous town of 2,500 mushroomed to a city of 10,000 and the end was not in sight. Such headlong growth entailed serious problems in the provision of electric light and power for both domestic and commercial use. At the dissolution of the North Continent Utilities Co. in 1945, the Town of Farmington had acquired the distribution system for an area with radius of 11 miles from the center of town and generating facilities consisting of a 200 kw. hydro plant and a gas engine plant with two 300 hp. Rathbun-Jones and one 250 hp. Bruce-McBeth units. These modest facilities supplied not only the city's 11-mile circle but all of the San Juan County through the lines of the Basin Light &

Power Company. Farmington then contracted with Basin to operate the city's power system.

Additional prime movers were added quickly in 1946 and '47: two more 250 hp. Bruce-McBeths and two 370 hp. Ingersoll-Rands. By 1949, the boom was under way and the city quickly constructed a new power house and installed two 250 hp. Bruce-McBeths and a 932 hp. Ingersoll-Rand. Incredulously, officials watched town and power load grow and recognized that they would have to progress to larger generating units. The next engine chosen was an 8-cylinder, 16 x 20 in., 360 rpm.,

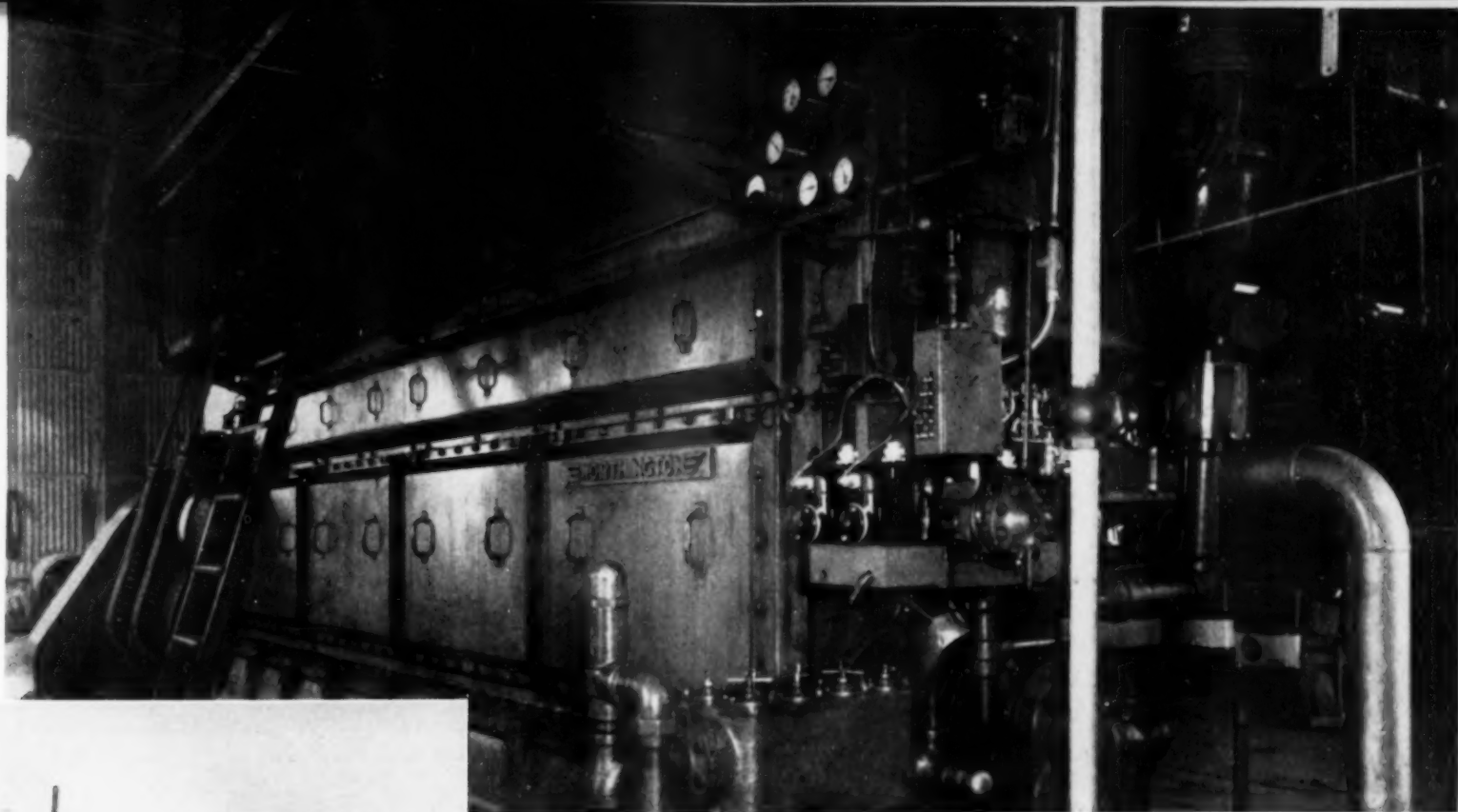
## FARMINGTON, NEW MEXICO

Worthington natural gas unit rated at 1,525 hp. at the plant's 5,280-ft. elevation. After an initial period of break-in and adjustment, this engine was put into virtually continuous operation in October 1952. In the next six months, the engine ran 24 hours a day 7 days a week except for a total of 15 hours for inspection and preventive maintenance.

In that six-month period, this one prime mover produced 3,659,700 kw. hr., more than 53 percent of the total 6,793,781 kw. hr. generated by the whole system with its eleven engines and hydro plant. To carry the peaks, all eleven engines must be run at full load, but in off-peak hours, the Worthington handles a disproportionate share of

the work. Reason for this preferential use is apparent in fuel consumption statistics. The old plant averages about 20 cu. ft. of natural gas for each kw. hr. generated. At the new plant, with the big engine carrying three-fourths of the output, average plant fuel consumption has gone as low as 12.05 cu. ft. per kw. hr.

Table I shows an interesting correlation between the percentage of production handled by the big unit and average plant fuel consumption. Thus, in a month when the engine produced only 15.7 percent of the total output, a plant gas consumption was 17.1 cu. ft. per kw. hr. With the new engine up to 50.7 percent, plant consumption dropped to



This view of the Worthington engine shows the Cumo lube filter, the Bendix-Scintilla magnetos, Alnor pyrometer, Marsh pressure gauges and Elliott turbocharger.



### Eleven Natural Gas Engines and Hydro Plant Meet Boom-Town Demand; One Worthington Generating 53 Percent of Total Output

15.8 cu. ft. In the last month recorded, the Worthington generated 74.6 of the plant total and consumption was down to 12.05 cu. ft. per kw. hr. A single meter measures gas consumption for the entire plant but calculations indicate that the new Worthington is producing a kilowatt-hour on a consumption of just 10 cu. ft. of natural gas.

The engine which is achieving this level of efficiency is one of its kind, a supercharged, high-compression, spark-ignition natural gas engine. It has a compression ratio of 12 to 1, equal to that of a diesel and attains the efficiency of the diesel. There are, of course, a number of important differences. Gas requires a higher temperature than

oil to initiate combustion and spark ignition is utilized rather than heat of compression. No pilot oil is required as in the case of the dual-fuel diesel. In the average low-compression gas unit operating on the Otto cycle, the price for eliminating oil is higher gas consumption and lower thermal efficiency, but the new high-compression engine cuts gas consumption sharply and still avoids use of relatively high priced oil. At Farmington, where the gas supply is certain and abundant and the price is a low 16 cents per mcf., the new engine's consumption of 10 cu. ft. per kw. hr. means a total fuel cost of just 1.6 mills per kw. hr.

For proper operation, the spark-ignition engine requires an almost perfect mixture of gas and air.

The Worthington achieves this through a governor-controlled air admission valve at each cylinder. Working in conjunction with the individual gas-metering valves, this system responds sensitively to changes in load and maintains the air-gas ratio necessary for maximum fuel economy. The 1,000 Btu. natural gas reaches the plant at 140 psi. and is reduced to 11 psi. before admission to the cylinders. The high compression engine requires an igniting spark with high penetrating value and effective ignition is insured on this unit by four magnetos with high energy induction coils.

Lubricating oil is circulated to bearings and for piston cooling by an engine-driven pump and,

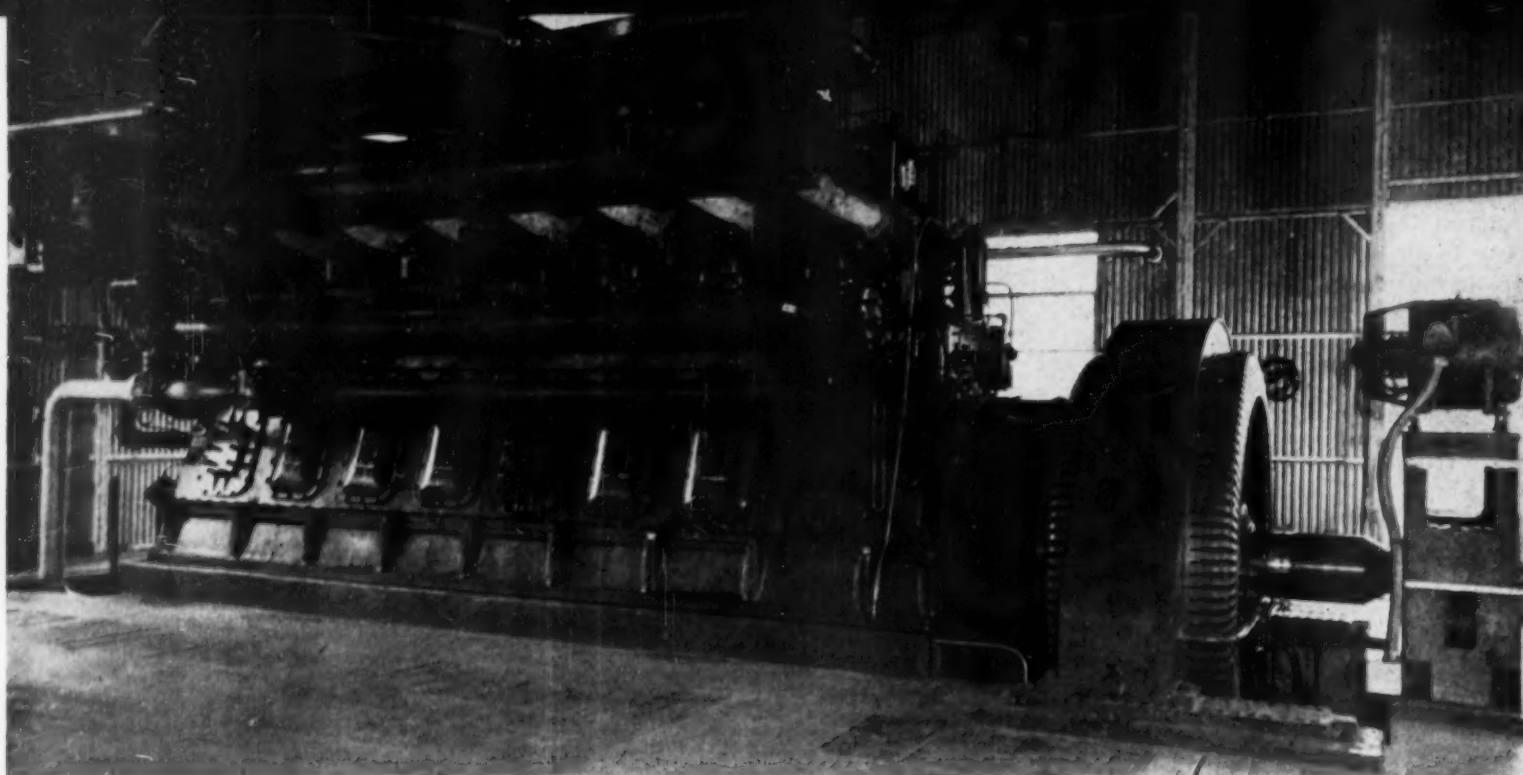
through McCord lubricators, to the cylinders. Included in the crankcase circuit are a shell-and-tube oil cooler, an 8-element full-flow filter and a fullers earth cartridge by-pass filter. Cooling water for the Worthington is circulated by a motor-driven centrifugal pump through the finned tubes of a dry-type cooler with a variable-speed motor-driven fan.

Water returns from the cooler through the oil cooler. Water temperature is controlled automatically by a thermostatic by-pass valve and, in addition, the cooler fan motor can be controlled from inside the plant. Winters can be cold at this altitude and ethylene glycol is added to the cooling system for the winter months.

Fabulous Farmington is a place where opposites live happily together. The Indian may work in an ultra-modern plant, turning out gasoline, butane or propane; or he may hunt for deer along a natural gas pipeline. There is no friction between city dweller and farmer on costs of electricity, for both pay identical rates. Basin Light & Power and the Town of Farmington agree that, since the rural population does much to support the city, it is both fair and good public relations to have a universal rate. There is no friction between utility company and municipality. Mr. Willis Martin, president of Basin Light & Power, was a pioneer in provision of electricity for this area, for back in 1904 he was sole owner of the original local power company.

Today he manages the combined utility and city-owned systems, integrated for maximum operating efficiency and service to the population. This is just an interim report on Farmington's power progress. The load is still growing and further plant expansion appears inevitable. With the demonstrated efficiency of the high-compression gas engine, further improvement in plant production economy seems equally certain.





The exhaust side of the Worthington engine, showing the exhaust-driven Elliott turbo-charger. This high-compression, spark-ignition gas engine is producing a kilowatt-hour on just 10 cu. ft. of gas at a total cost of 1.6 mills.

TABLE I

**Town of Farmington Animas Plant**

Month	Kwh. Generated Worthington	Total Plant	Mcf. Gas Total Plant	Cu. Ft. Gas per Kwh. Total Plant	% Kwh. Produced by Worthington
April, 1952	176,400	507,600	7,441	14.6	34.7
May	67,600	430,120	7,373	17.1	15.7
June	293,000	576,940	9,100	15.8	50.7
July	361,600	628,340	9,530	15.2	57.5
August	299,400	643,340	10,066	15.6	46.5
September	490,700	723,330	10,436	14.4	68.2
October	461,000	693,100	9,436	13.6	66.9
November	582,300	824,450	11,284	13.7	70.6
December	642,900	867,720	11,134	12.8	74.0
January, 1953	652,200	881,860	10,974	12.4	73.9
February	689,900	917,000	11,072	12.1	75.2
March	631,400	845,810	10,194	12.05	74.6

**List of Equipment**

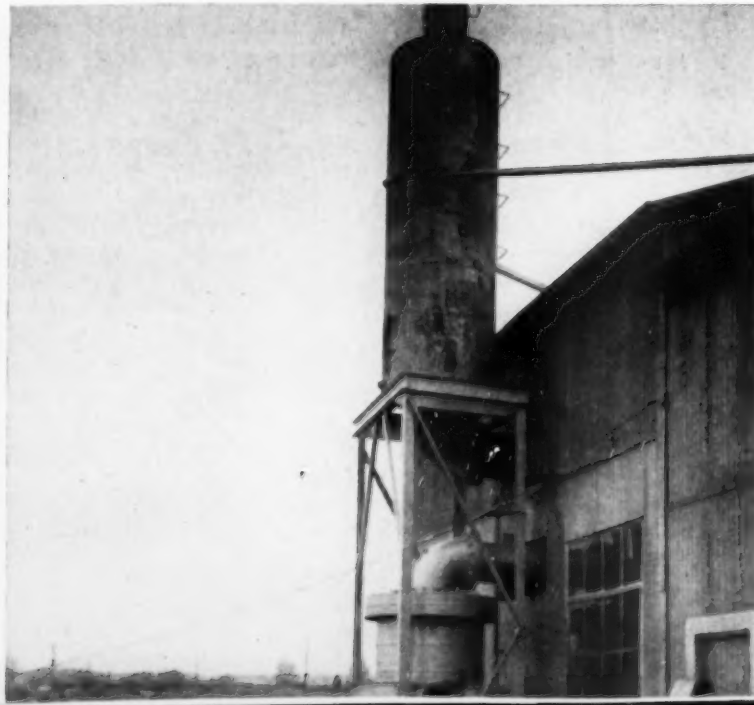
Engine—Model SEHG 8 high-compression, spark-ignition, supercharged natural gas engine, 8 cylinders, 16 x 20 in., 360 rpm., 1,525 bhp. at 5,280 ft. elevation. Worthington Corp.  
 Generator—Electric Machinery.  
 Governor—Woodward.  
 Exhaust turbocharger—Elliott.  
 Magnetos—Bendix-Scintilla.  
 Jacket water cooler—Young Radiator.  
 Jacket water pump—Worthington.  
 Thermostatic valve—Fulton Sylphon.  
 Lube oil cooler—Sims.  
 Lube filters—Cuno and Hilliard.  
 Cylinder lubricators—McCord.  
 Gas pressure regulator—Fisher Governor.  
 Gas meter—American Meter.  
 Air filter—Air Maze.  
 Exhaust silencer—Maxim Silencer.  
 Exhaust pyrometer—Alnor.  
 Switchgear—Westinghouse Electric & Mfg. Co.

32

Lubricating oil is by-passed continuously through this Hilco fuller's earth filter.



Air for the Worthington engine is drawn through an Air Maze filter. Exhaust gases vent through a Maxim silencer.





# Marquette HYDRAULIC GOVERNORS

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like the "Cape Karluk"*



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## **COOK Piston Rings**

### **SAVE \$19,509 By Increasing Efficiency—**

### **ADD 10 Years' Life To "Worn Out" Liners!**

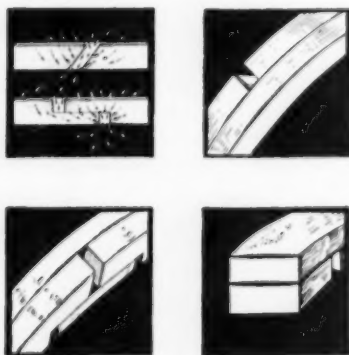
High fuel and lubricating oil consumption indicated new cylinder liners were in order for the municipality's two 350 kw Diesels. Before making the necessary \$3600 outlay, Cooktite Sealing Rings were given a trial. That was 10 years ago! Since then, the "worn out" liners and original Cook Rings have rolled up the following record on these two engines —

Total operating hours.....	89,159
Total kw generated.....	22,250,000
Average increase kwhr/gal.....	.64
Total savings (included fuel oil, lube oil and cost of replacement liners).....	\$19,509.00

Naturally, when two *new* engines were added by this power station, both were fitted with Cooktite Rings the first time pistons were pulled.

This is the kind of performance that has made "Cook" the No. 1 Piston Ring specification with scores of engine and compressor users for over 30 years. If you're looking for a seal with the savings *built in*, write today for product information and name of your nearby Cook representative. C. Lee Cook Mfg. Co., Inc., Louisville 3, Kentucky.

\*Name of user supplied on request

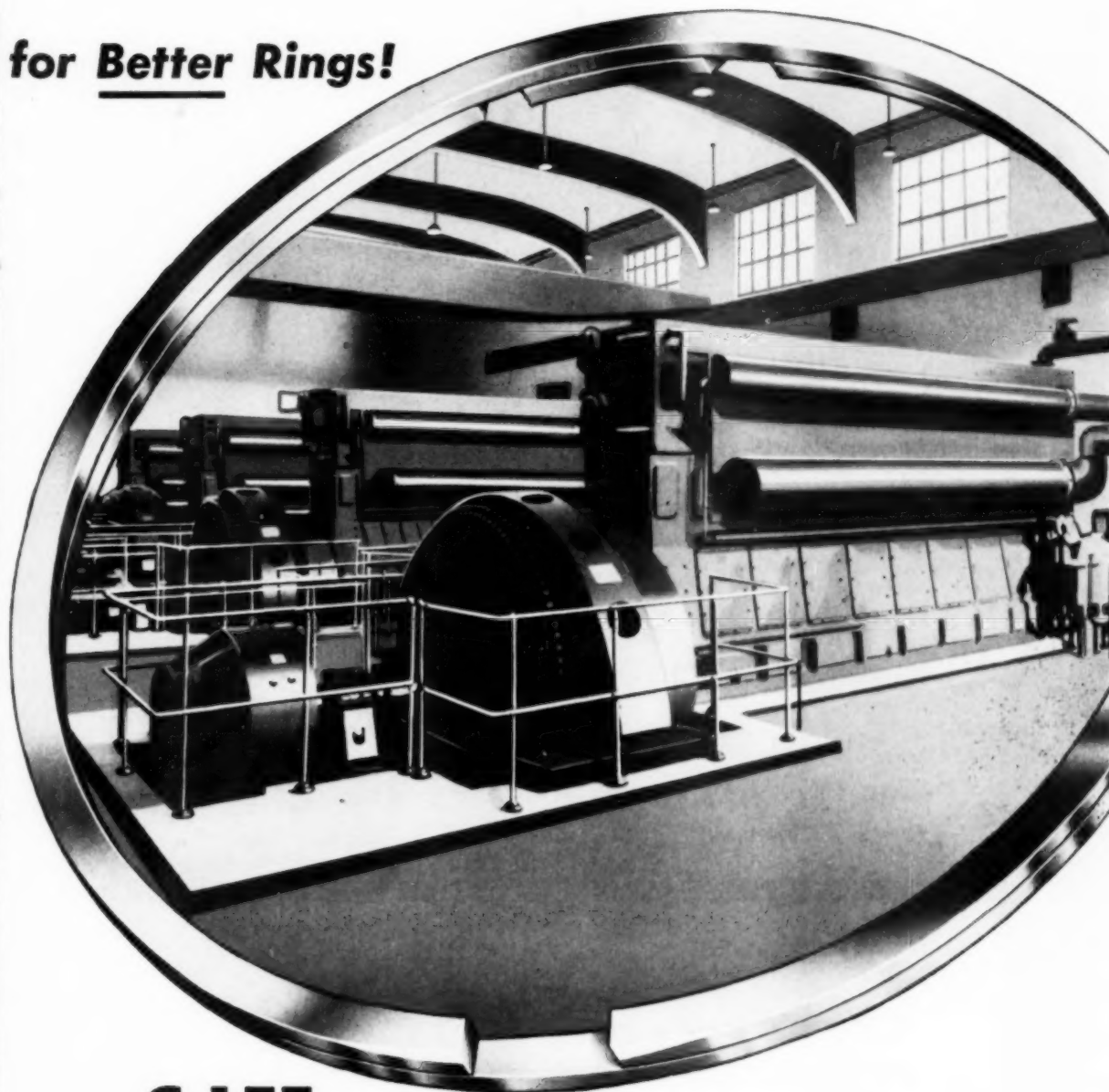


In the thumbnail sketches: **Fig. 1** illustrates how compression and firing pressures leak through the joint openings where ordinary rings are used alone, which increases rapidly with accumulated wear. **Figs. 2 and 3** show how the Cooktite gaps remain continuously sealed, even when used in worn cylinders, and after considerable ring wear has occurred. **Fig. 4** shows how full depth radial strength in both parts of the Cooktite accounts for its long life and dependability, even when used in extremely worn cylinders.

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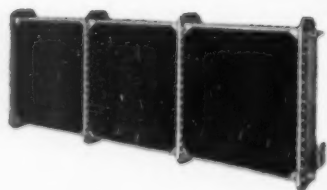
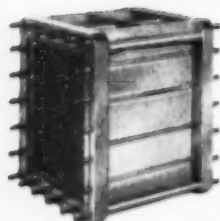
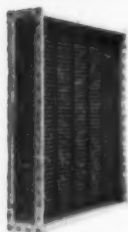
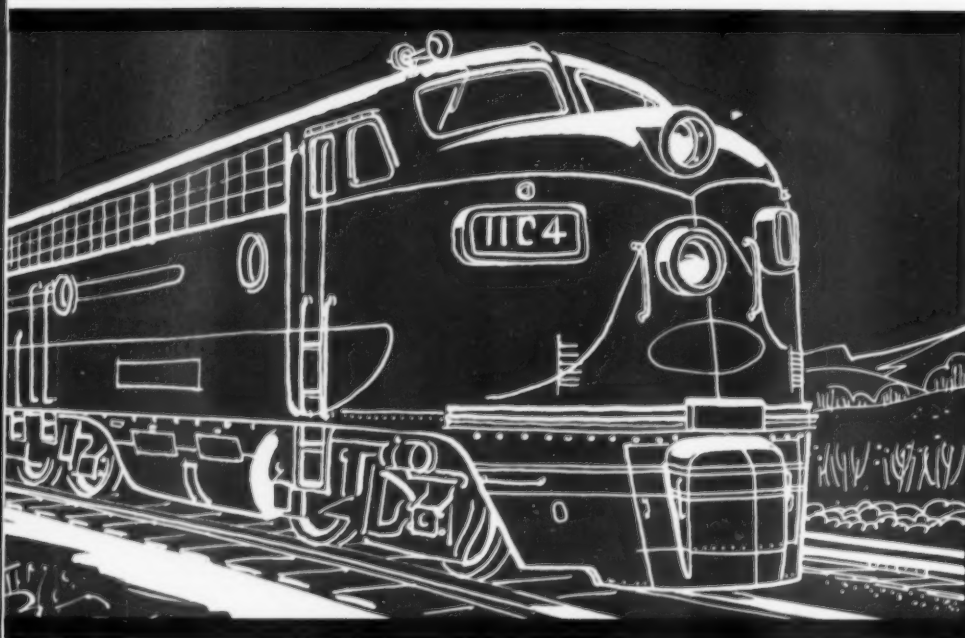
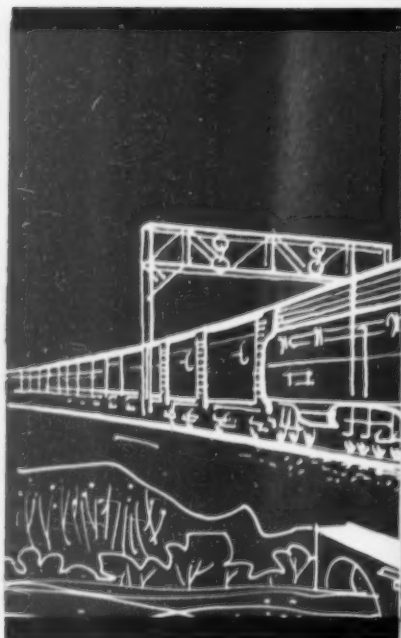
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Diesel streamliners are going faster—diesel freights are pulling more weight than ever before! And Harrison is keeping pace with diesel progress . . . with temperature-control equipment specifically designed to save space and weight. These rugged, heavy-duty lube oil and jacket water coolers are doing a dependable cooling job day after day, mile after mile on the newest diesels. For every Harrison heat exchanger is quality-built—backed by years of research and development. That's why a majority of diesels in service today are Harrison-cooled. If you have a problem of temperature control, Harrison has the answer!

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## NEW NAVY MINESWEEPERS

**New Navy Minesweeper No. 116 Typical of This  
Wood and Diesel Ship Type AMS**

*By* CHARLES F. A. MANN

**I**N all the long history of wood and diesel ship construction on the Pacific Coast, perhaps in the entire U.S.A., no group of contracts are more fascinating and unusual than the Navy's several classes of non-magnetic minesweepers that have been under construction during the past few years. Not only has the Navy been ingenious in designing the ships, but it has sparked one of the greatest tests of old-fashioned American ingenuity among the supplier and machinery builders ever known.

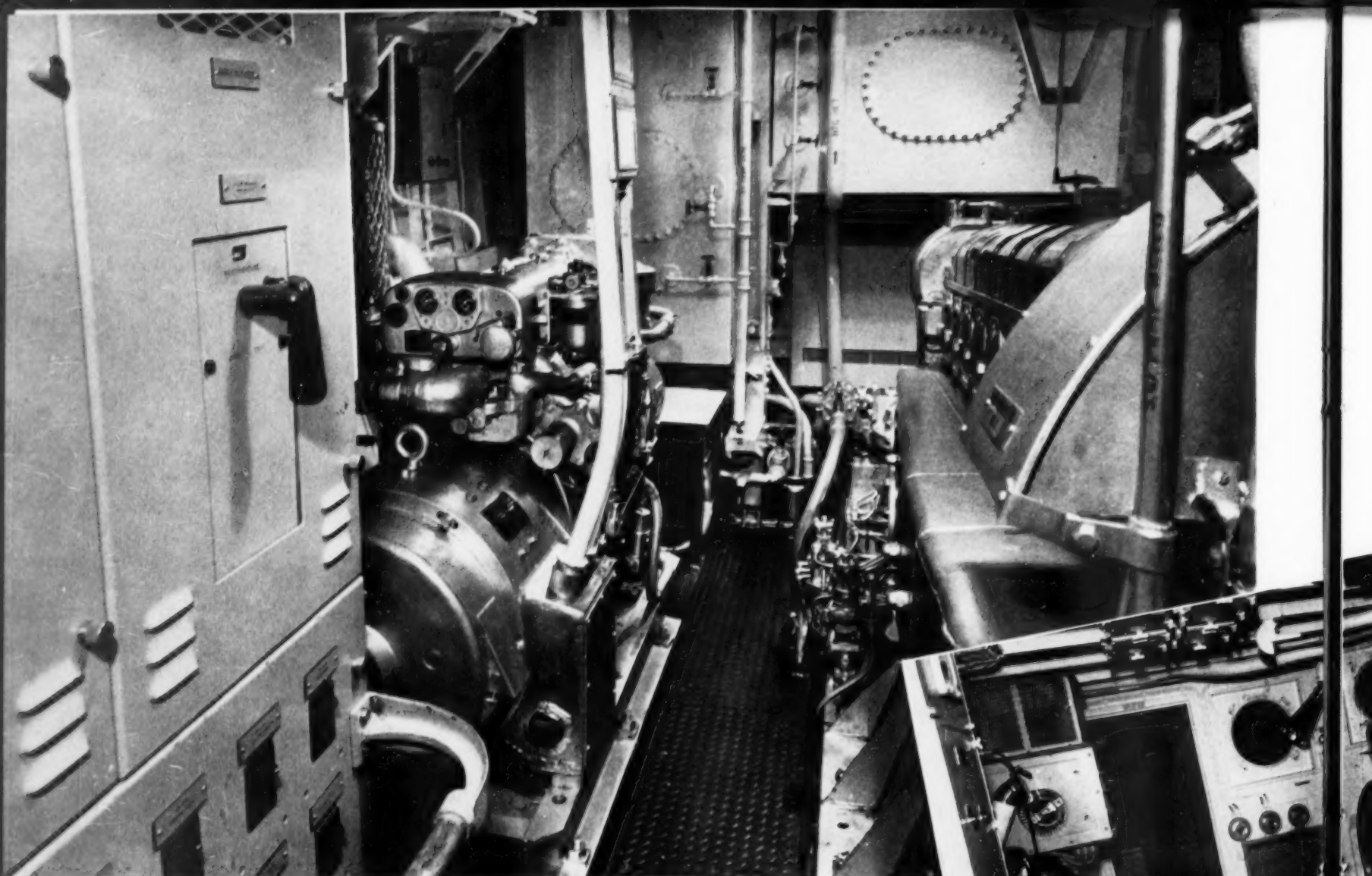
Representing the best Navy thought at combatting the mine menace in the world's harbors, to keep the waterways free for naval and merchant vessels, each of its major ships represents a huge capital

cost when it leaves the shipyard where it was built, but in addition it represents direct Navy purchases outside the builder's list of an amount almost equal to the contract price. Nothing like it before. On Puget Sound a great share of the Navy's Pacific Coast allotment of work has been underway for the past 36 months. Of the various classes of minesweepers built, none is more interesting than the AMS 60 class, and no better example of finished vessels (according to the Navy spokesmen who helped us line up this story) can be found in the contracts for ten allotted to Tacoma Boatbuilding Co., Inc., at Tacoma, renowned for their wood and diesel construction up and down the Coast. The ten of this single class represent over \$8,000,000

worth of contracts. The Navy bought for its own account machinery and special equipment totalling over \$7,000,000, to give us basic units in what will be the world's largest and finest equipped devices for ridding the seas of enemy mines.

Tacoma Boat produced AMS Nos. 113 to 118 and 96-99, inclusively and will complete delivery of all ten by the middle of 1954. Basically these vessels are unique in that they follow not only the highest standards of wooden ship construction, but they are as near 100% non-magnetic as American industrial and engineering ingenuity can make them. Standard and long-tested engines and accessories regularly built of steel and iron and conventional





Aft machinery space, looking aft, Cleveland Diesel Model 268A to the right, Detroit Diesel with Delco generator to the left. Briggs and Cuno filters on main engine.

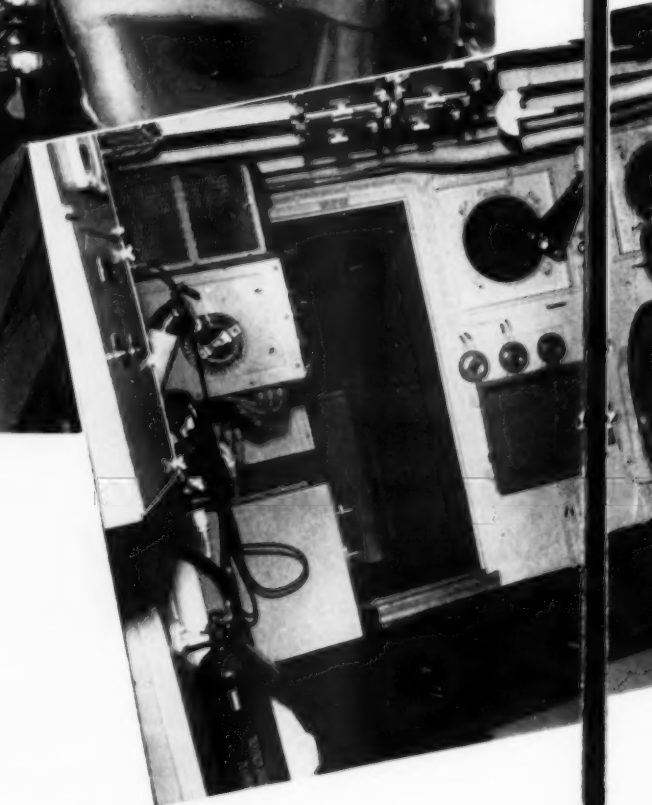
castings emerge in bronze, aluminum, monel, stainless-steel and brass, right down to heavy winch gears, flywheels, tail shaft, rudders, tanks, screws, nuts, bolts, cables, rods, frames, valves, switches, fans, electric ranges, complete boilers, laundry machinery to keep the crew's pants clean; cables, doors, safes for the captain's office and fireproof gear including the CO<sub>2</sub> fire extinguisher bottles! Down inside the diesels everything is non-magnetic—and terribly expensive, right down to crank-shafts and connecting rods! Only the stubborn characteristics of electric motors and generators relying on iron for their very magnetic currents resisted the change to other metals, but placement and shielding of even these has made non-magnetic motors out of all!

When the final history of the Navy's non-magnetic ship construction is written, new chapters in American productive capacity and ingenuity will be written for all time . . . only not too much detail can be given now, in the race to make America safe from any acts of aggression from afar. Battleships, aircraft carriers and submarines all have their secrets and their special glamor, and so does the minesweeper fleet, the like of which the world has never seen before. Taking the AMS class as a group, and the ten built at Tacoma Boatbuilding Co. as more than typical, they bear describing simply as dieselized boats, with the special Navy gear left for a later edition of *Janes Fighting Ships*.

published in London! Principal dimensions are as follows: Length, 114 ft.; beam, 26 ft. 10 inches; Depth, 13 ft. 4 inches; draft, 8 ft. 4 inches; displacement tonnage, 375; maximum speed, 13 knots; crew, 35 men, 4 officers.

They are built of costly bent oak framing shipped to the northwest from the mid-south, with double thick Douglas fir planking and sheathing above and below the waterline of heavy oak. All fastenings are of bronze, brass or stainless steel and each represents a \$1,500,000 cost delivered. The elaborate acceptance tests and Navy outfitting at Tacoma Naval Station put the vessels through the toughest and longest series of tests ever given ships this size. Tank capacities are fuel oil, 8000 gallons; lube oil, 400 gallons and fresh water, 2,500 gallons. All tanks are of aluminum bronze plates stout enough not to shake to pieces, corrode or fail due to flexing. Supplementing the fresh water storage, is a non-magnetic design Badger water distillation plant, fed by 3 Warren 1¼ hp. distiller pumps, permitting constant water supply in the world's worst areas or for long offshore duty away from land supply.

The vessels are fitted with a Hyde hydraulic steering gear, likewise 100% non-magnetic in bronze, brass and stainless steel, with mechanical control from the pilot house steering wheel and electric fluid pump—and of course it turns a bronze rudder mounted on a bronze shaft! Twin Columbian



Pilot house with Westinghouse Air Brake controls as standard on all ships.

bronze 4-bladed propellers, 60 x 54 inches, rotating at the end of a forged aluminum bronze tailshaft, through Goodrich cutless bearings, and spinning at top speed of 358 rpm., push them along at about 12-13 knots top speed. Below the main deck, outside the maze of tanks and main machinery, is of course the elaborate minesweeping gear. The whole after part of the main deck is minesweeping gear. Forward is the roomy crews' and officers' quarters in traditional Navy severity, but with plenty of light, fresh air, heat, and plenty of galley capacity.

The main propulsion diesels are a pair of unique special designed General Motors 8 cylinder 268 A type 2 cycle engines, non-magnetic, of course, developing 440 hp. each at about 1000 rpm. and driving through Farrell 3:35-1 reduction gears and with



Snow Nabstedt air clutches. Reverse gear is built in and all is operated by Westinghouse pneumatic controls, from the pilot house. The diesels are cooled by fresh water through Ross heat exchangers, and lube oil coolers. A Ross oil cooler keeps the gear case oil at the proper temperature. Fulton Sylphon control valves through all oil and water circuits. The bronze tailshafts, by the way, were either produced at Camden Forge or Struthers Wells, depending on which vessel got which shaft. Stainless steel Maxim silencers are fitted in the large stack on the main deck.

Two 2 cylinder 11.4 cfm. Worthington air compressors are fitted for air starting, driven by  $7\frac{1}{2}$  hp. Reliance motors, feeding stainless steel air bottles. The main diesels carry Marquette governors and a single De Laval fuel oil purifier is fitted, while lube oil passes through Cuno filters and Briggs' by-

pass lube oil filters. Electric Tachometer Corp. supplied the tachometers, while Blackmer lube and fuel oil hand operated transfer pumps and Roper lube and fuel oil power operated transfer pumps are used once the ship is started up. Two Buffalo fire and bilge pumps, with  $15\frac{1}{2}$  hp. Reliance motors and an Aurora  $\frac{3}{4}$  hp. fresh water pump is supplied. Manning & Lewis built the two 10 cu. ft stainless steel air bottles. Ship's services electric supply is by two 60 kw. 96 hp. 4 cylinder Model 4901 Detroit Diesel (GM) sets, driving 120 volt Delco dc. generators.

Gould storage batteries are supplied, 108 volt 18 tray set; a pair of 24 volt 8 tray starting batteries and two 8 volt 8 tray sets for portable floodlighting circuit. The fantastic degaussing electric supply comes from an identical pair of 440 hp. General Motors diesels, identical to the main propulsion engines, with 5000 lb. bronze flywheels for added momentum for those sharp, high overload periods, and General Electric generators with built-in water air coolers to keep the generators from burning up.

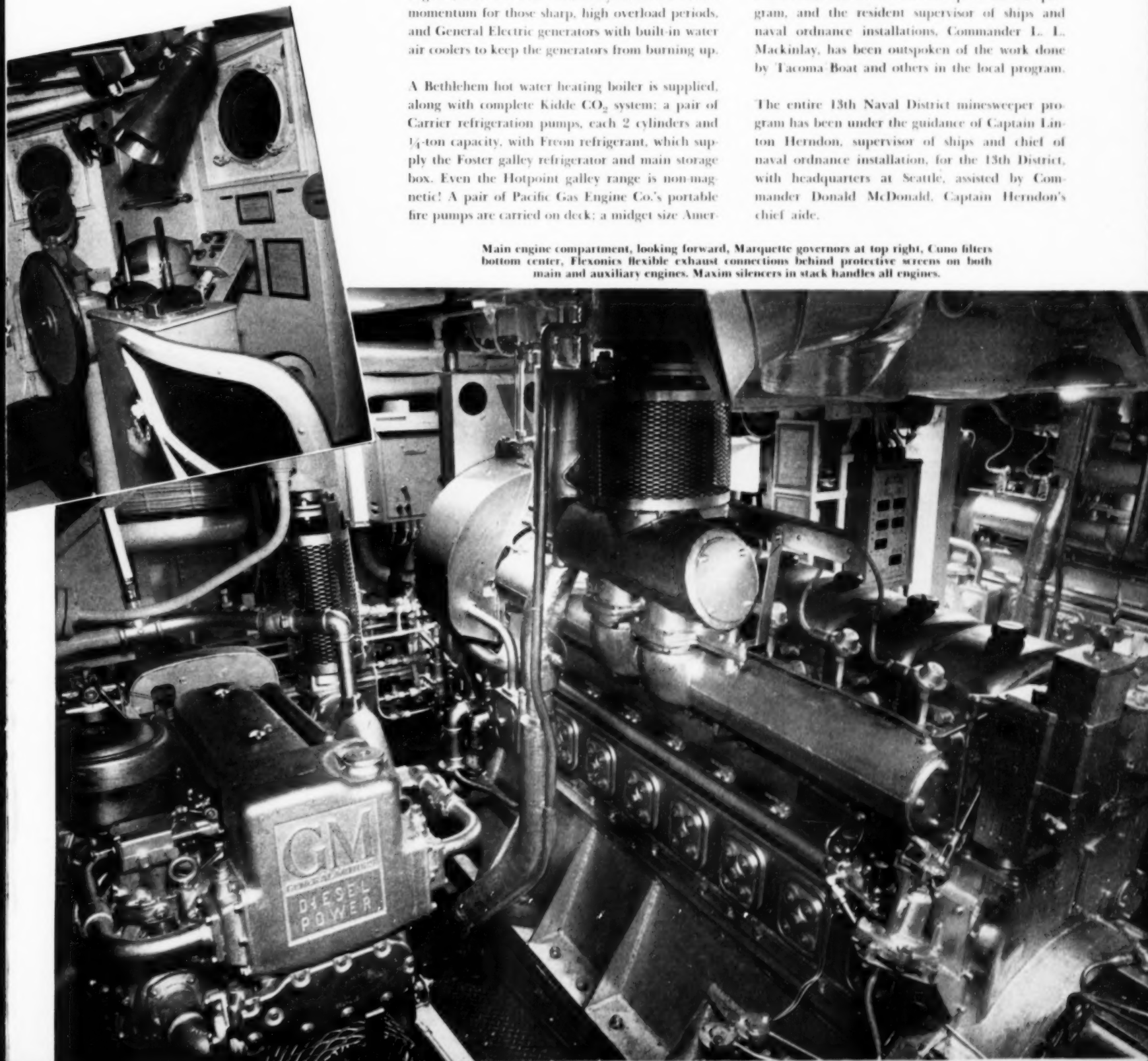
A Bethlehem hot water heating boiler is supplied, along with complete Kidde CO<sub>2</sub> system; a pair of Carrier refrigeration pumps, each 2 cylinders and  $\frac{1}{4}$ -ton capacity, with Freon refrigerant, which supply the Foster galley refrigerator and main storage box. Even the Hotpoint galley range is non-magnetic! A pair of Pacific Gas Engine Co.'s portable fire pumps are carried on deck; a midget size Amer-

ican Laundry Machinery Co. clothes washer and a large electric powered Gyroscopic ship's stabilizer to reduce roll in a rough sea, is fitted. This was made by the A. H. Rendt Instrument Co. Other equipment items include Ideal Anchor Winches; Sperry Gyrocompass; Navy type radar; 3 radio installations and Wilfred O. White's depth finding equipment, and is topped off with a Cunningham air whistle.

To create this type of ship with the equipment given above, on a non-magnetic basis, is food for thought for the marine world . . . but it was accomplished, and exhaustive tests of every item showed it worked as well or better than its conventional counterparts made by the same manufacturer in conventional iron and steel. Approximately 100 Navy vessels in this program have been built by Tacoma's famed wood and diesel shipyards. Tacoma Boat has other extensive parts of this program, and the resident supervisor of ships and naval ordnance installations, Commander L. L. Mackinlay, has been outspoken of the work done by Tacoma Boat and others in the local program.

The entire 13th Naval District minesweeper program has been under the guidance of Captain Linton Herndon, supervisor of ships and chief of naval ordnance installation, for the 13th District, with headquarters at Seattle, assisted by Commander Donald McDonald, Captain Herndon's chief aide.

Main engine compartment, looking forward, Marquette governors at top right, Cuno filters bottom center, Flexonix flexible exhaust connections behind protective screens on both main and auxiliary engines. Maxim silencers in stack handles all engines.



# YOU CAN USE HEAVY FUEL

## The First of a Series of Articles Describing and Illustrating the Successful Use of Heavy Fuel in Diesel Engines in Pipe Line Work, in Marine Applications and in Municipal, Utility and Industrial Diesel Power Plants

**A**S Perry W. Wilder of the Sharples Corporation so aptly put it at a recent technical meeting, "Using heavy fuels has become an economic necessity in many areas during the past five years due to the increasing price differential between distillate grades and residual fuels. In areas where No. 2 distillate sells for 9.86¢ per gallon, residual may sell for 5.8¢. This difference, of course, depends somewhat on transportation costs and must be examined for each section of the country. Heavy fuels have been burned in low speed diesels on ships in this country since 1934 with large savings to the operator. For example, one 15,000 ton tanker saved \$120,000 in a single year by switching from No. 2 distillate to residual fuel. Many vessels of this tonnage in Europe have been converted almost one hundred percent to heavy fuel operation. Much thought is currently being given to conversion in the Great Lakes area and Gulf Coast. Many companies in these areas have already successfully switched over."

When we asked Mr. Wilder for his recommendations on processing heavy fuel for successful use in diesel engines, he pointed out that the term "heavy fuel" includes a number of oils, not only the straight residuals (Bunker "C") but also blended fuels and even crudes. Thus, the best operating conditions, particularly temperature, will vary from oil to oil. He suggested that 200°F. be maintained for most residual fuel oils while on others having lower viscosities a temperature at least 10°F. under the flash point would be satisfactory. On some crude oils the operating temperature has been reduced to 105°F., but even at this temperature well under the flash point the low viscosity assures satisfactory centrifuge performance. In discussing the use of crude oils in diesel engines, particularly in pipe line pumping stations, Mr. Wilder noted the rather unique operation of the centrifuge in this application. The centrifuge here can perform a skimming operation removing over 70% of the crude as clean fuel oil and discharging through nozzles the remainder as a heavy phase. This heavy fraction contains waxy material, sludge, water and sediment can be returned to the pipe line.

As we look at it, the problems of burning heavy fuel in diesel engines might be illustrated by this

formula: heat + water separation + centrifuging + filtration + high temperature jacket water cooling = successful heavy fuel use. This particular article deals with the Trans Mountain Pipeline running from Edmonton, Alberta, to Vancouver, B. C., but before we go into these details, we would like you to think of using such units as Warner Lewis Excel-so water separators in the fuel line. These Warner Lewis units are made in many different styles and sizes to fit the individual requirements and do a very satisfactory job of separating out the water which is so prevalent in heavy fuels, so necessary to eliminate before these fuels are used by the diesels.

Another thought to carry in your mind when laying out a system for burning heavy fuels in your own plant is that of high temperature jacket water cooling of which Vapor Phase is one system and Maxim Silencer another, achieving similar results, mainly of maintaining the jacket water at high temperature, the top of the cylinders at high temperature, and of providing a substantial quantity of steam for heating the fuel tanks, both day and storage.

This particular article, as mentioned above, deals with the successful use of crude oils on the Trans Mountain Pipeline, particularly at the Black Pool and Kamloops Stations, both of which are equipped with three Nordberg Model FSG-138-85C four-cycle supercharged, supairthermal diesel engines, bore 13 inch, stroke 16½ inch, rated at 1760 hp. at 500 rpm. The Edson Station is equipped with three Nordberg six cylinder diesels, same general model, rated at 1320 hp. at 500 rpm. The fourth station on this big pipe line is located at Edmonton, Alberta and differs from the other three in that it operates on the dualfuel system, because natural gas is available at the end of the line at Edmonton.

The schematic drawing on this page illustrates the crude oil fuel system used at the Edson, Black Pool and Kamloops stations. It is of considerable interest and it stands as probably the most efficient system yet developed for burning crude oil of varying specifications in standard model diesel engines. The system used on the Trans Mountain Pipe Line was developed by the Winslow Engineering Company in full collaboration with the Union Oil Company

and its facilities at the Antelope, California Pipe-line station. (DIESEL PROGRESS—October, 1951 issue) After two years of successful use the Union Oil Company applied the same general system in converting their Junction, California Pipe Line station to the use of heavy crude taken directly from the line (DIESEL PROGRESS—September, 1953).

A measured amount of crude oil from the pipe line is pumped into a storage tank at each station for use as fuel by the engines. The crude oil usually contains sludge and foreign materials, some of which will settle out in the storage tank, but most of the impurities will stay in suspension because they have nearly the same specific gravity as the oil. The large pieces are removed as the crude is pumped through a jacketed Winslow filter which contains treated elements for removal of moisture, large, solid particles and for neutralizing dissolved sulphur compounds. The oil is then pumped by the Roper transfer pump to the water heated settling tank. This tank is heated because oil settles out its impurities faster and more completely when it is warmed to about 100° F. Oil, when mixed with water, tends to form an emulsion. When heated, the oil and water separate and the water will settle out since it is heavier than the oil.

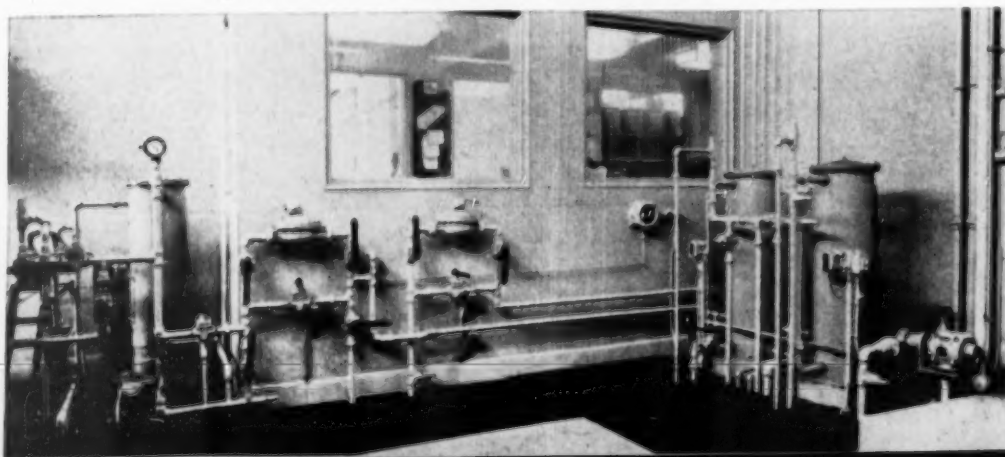
The crude oil is then drawn from this settling tank by the fuel oil filter pump. From this point on it is possible to run the oil through any combination of oil treatment equipment by manipulating the proper valves in the system. The treatment required for the fuel will depend on the condition of the oil, and what is required to make it suitable for combustion and usable so it will not damage the finely made parts of the fuel pumps and injectors on the diesels.

One of the most important treatment units is the Sharples centrifuge and heater. This unit is used at all times when treating oil since it will remove both water and foreign particles which remain in the oil. From the centrifuge the crude goes to a second jacketed Winslow filter, which has treated elements of a much more dense construction. This second filter pass removes more moisture and some of the finer particles which have the same density as the oil and therefore could not be thrown out by the centrifuge. This second Winslow unit will, also, further neutralize acid formation if existent.

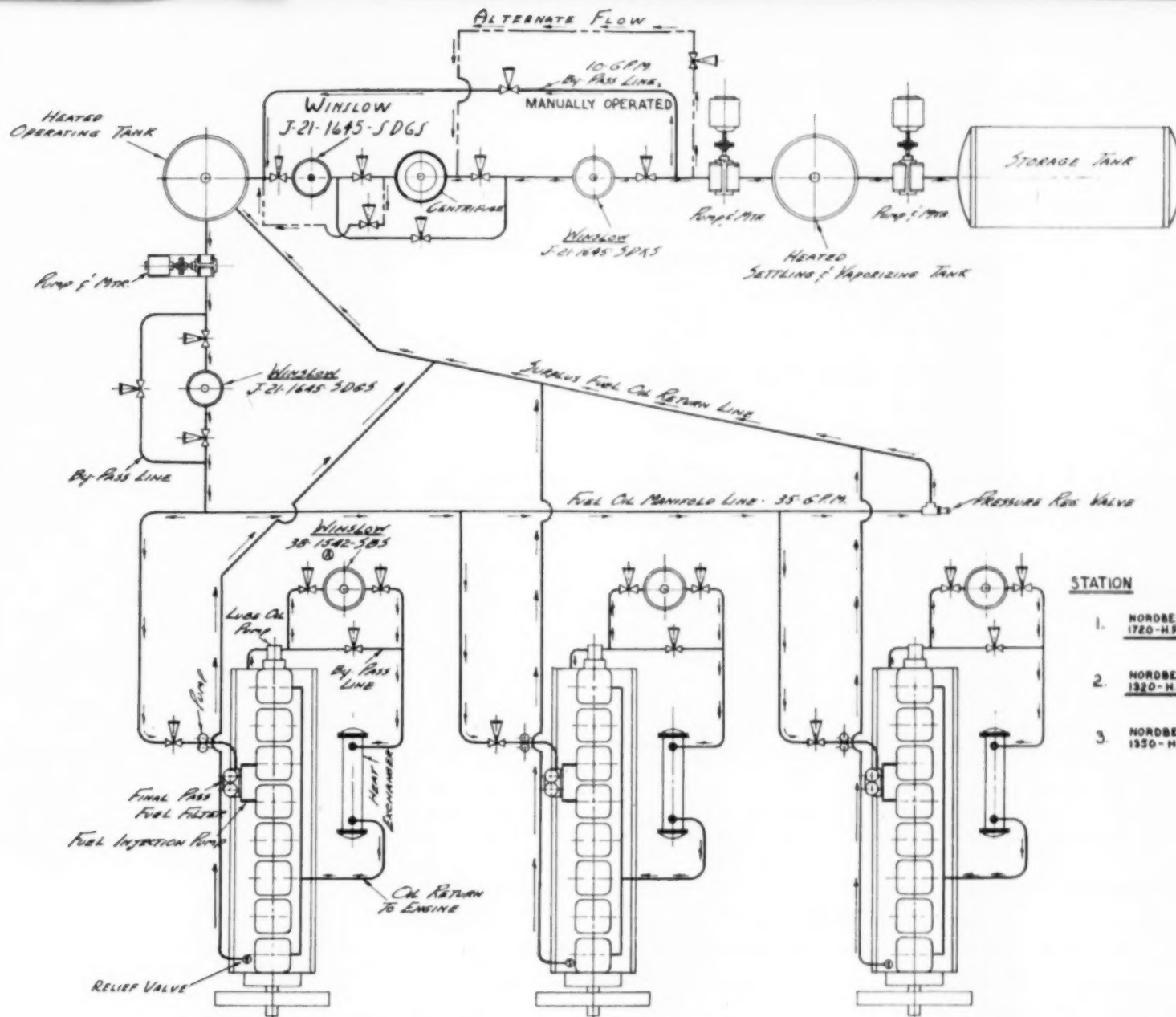
The crude now is pumped into the clean oil tank or operating tank which is set up in a recirculating system in such a manner that approximately five times engine consumption is continually recirculated at controlled temperatures through a jacketed Winslow filter. This filter is identical to the second Winslow filter in the primary stage and in its recirculating system further neutralizes acid, drops out moisture and removes finer particles.

It has been found that control and recirculation of crude oil through chemically treated filters will supply to the engine a very satisfactory fuel. The treatment performs a function through neutralizing and absorbing of dissolved compounds and through the coalescing of finely dispersed moisture. The removal of these two products breaks the

Typical installation of Winslow filters as indicated by schematic drawing.







Schematic drawing of the fuel filtration and treatment layout at the Black Pool and Kamloops Stations of the Trans Mountain Pipeline Company. Note the Sharples centrifuge located in the top left hand corner of the layout. Alternate flows are possible with this layout as indicated to accommodate the four or five types of crude flowing through the line.

Type of Sharples centrifuge used on the Trans Mountain Pipeline Stations at Edson, Black Pool and Kamloops.

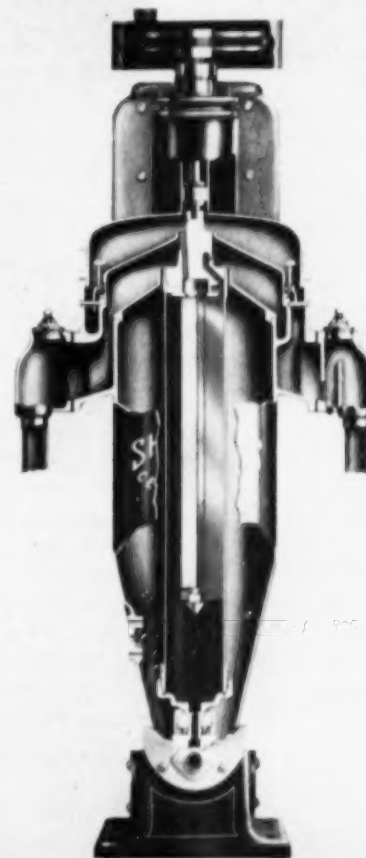
bond which might tend to form a colloidal or sludging action within these fuels. Naturally the removal of solid particles is a simple filtering process and does not cause serious concern. It will be noted in the preliminary treatment that the crude passes through first a coarse filtering medium, then a denser filtering medium in order to graduate separation of all contaminations and the system does not tend to prematurely plug the filtering media on the line, which might greatly shorten service periods. It might be noted at this time that each of the three Winslow crude oil filters installed in each of these three stations contains twenty-one treated elements, each one selected for the job assigned to it.

Getting back to the system again in detail, the crude passes, as we said before, to the clean oil tank where it is stored until it is to be used in the engines. It can also be pumped from the clean oil storage tank back to the settling tank for re-processing, if necessary. Thus the clean oil storage tank is kept full preventing condensation of moisture and recontamination. When the fuel goes to

the engines it is removed from the clean oil tank by the Roper fuel oil circulating pump and is piped through a Rockwell meter to indicate the amount of oil supplied each engine. The fuel then goes to a common header where it is distributed to all of the Bendix Scintilla injection equipment, after first passing through a very fine Nugent duplex filter and, of course, the individual engine fuel oil booster pumps.

Now, as we mentioned before, this is an adaptation or improvement on the system in use by the Union Oil Company at their Antelope and Junction, California pipe line stations and is heartily recommended for diesel pipe line service where more than one type of crude oil has to be burned in the diesels due to the varying specifications of the crude passing through the line.

Next month we will bring you another article on the successful use of heavy fuel in diesel engines. This time in the Tacubaya, Mexico installation, one of the largest public utility plants on this continent successfully operating on heavy fuel.





# AUBURN, NEBRASKA

## Economical Dual-Fuel Operation of Two Superior Diesel Engines Enables This Municipality To Pay Off Its Bonded Indebtedness of \$352,000 Within Seven Years

By DOUGLAS SHEARING

**C**LEARING up its bonded indebtedness five years ahead of schedule is the enviable economy record set by the Board of Public Works of Auburn, Nebraska. Planning to make the final payment in May 1954 of \$57,000 on an original debt of \$352,000 incurred about six years ago, the Board attributes this accomplishment to the economical performance of its two National Supply Co. Superior dual-fuel diesel engines. The first unit, a Model 80 S-8, 960 horsepower, 14½ in. x 20 in., 8 cylinder, naturally aspirated straight diesel was installed in 1946, and the second, installed in April of 1952, is a Model 80 GDEX-8, 1440 horsepower, 14½ in. x 20 in., 8 cylinder supercharged dual-fuel engine. The first unit was equipped with dual-fuel equipment in Oct. 1948, and with a supercharger in 1952 which increased its capacity to 1440 horse-

power to meet the demand for more power. The engines were installed to replace several small antiquated straight diesels.

Table I shows the economic improvement of 1949 operation over that for 1948. Table II gives the financial results of the operation before and after converting the original engine to dual-fuel. Even though production of power was increased from 4,395,825 kw. hr. in 1948 to 4,587,380 in 1949, expenses were actually reduced \$21,815.58. In a comparison of fuel costs for several periods, the figures are particularly interesting: The cost of oil fuel was 0.948 cents per kw. hr. in 1948, and the dual-fuel cost was 0.424 cents per kw. hr. in 1949. This includes the operation of the old straight diesel units. The Superior dual-fuel cost is below 0.3

**TABLE I**  
**Performance Figures for the Auburn, Nebraska Municipal Plant**  
**Showing Last Full Oil Year of Operation and the First Year of Dual-fuel**

1948	Total	Generation		Gas Used Mcf.	Fuel Oil Gal.	Lube Oil Gal.	Kw.hr. per Gal. Fuel	Kw.hr. per CF-Gas
		By Gas	By Oil					
January	361,150		361,150		29,912	269	12.09	
February	339,150		339,150		26,627	243	12.74	
March	351,900		351,900		30,404	244	11.35	
April	331,650		331,650		29,493	285	11.26	
May	339,450		339,450		27,084	255	12.53	
June	345,275		345,275		27,820	229	12.41	
July	391,900		391,900		32,912	312	11.91	
August	389,225		389,225		30,788	324	12.64	
September	351,950		351,950		27,970	300	12.66	
October	358,275		358,275		24,253	314	13.49	
November	367,025		367,025		28,128	264	12.60	
December	468,875		468,875		36,012	226	13.02	
1949								
January	402,050	340,200	61,850	3,713	9,335	194		10.97
February	353,575	315,550	38,025	3,422	6,610	148		10.84
March	388,650	347,825	40,825	3,848	6,732	130		11.06
April	360,100	337,050	23,050	3,924	4,837	94		11.63
May	368,550	311,700	56,850	3,619	7,644	125		11.61
June	376,375	351,000	25,375	4,016	5,331	129		10.66
July	407,550	359,475	48,075	4,146	7,801	155		11.53
August	404,325	328,725	75,600	3,818	10,051	165		11.59
September	357,580	289,550	68,030	3,386	8,999	142		11.63
October	374,300	317,700	56,600	3,721	8,549	115		11.71
November	366,775	315,225	51,550	3,657	8,354	104		11.60
December	427,550	352,450	75,100	4,026	10,132	120		11.42

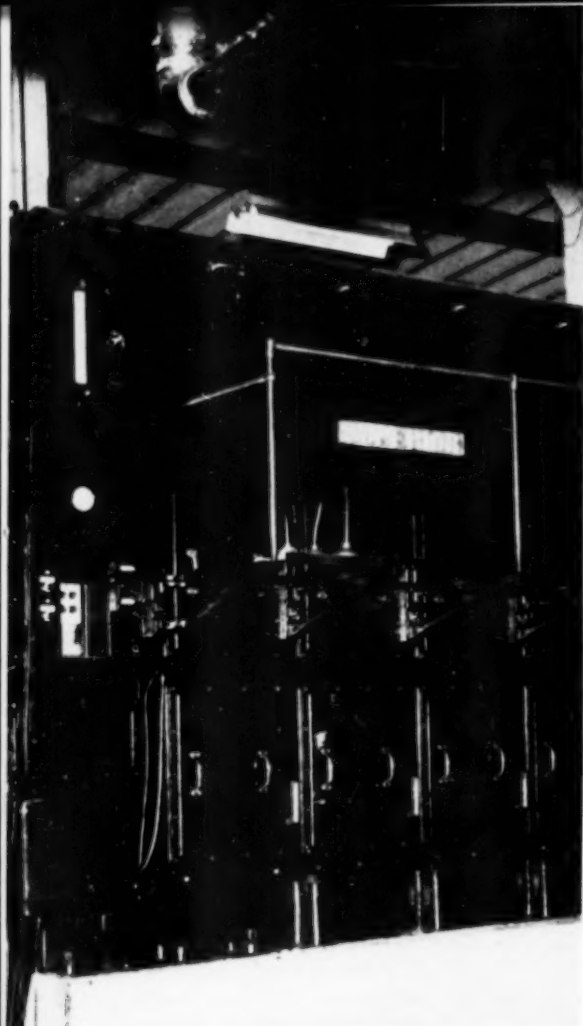


The two Superior dual fuel Elliott-Buchi turbocharged diesels responsible for the operating economies that speeded up the repayment of the bonded indebtedness of the Auburn, Nebraska power plant. Frank Sitherwood, pictured with the engines, is chief engineer. Governors are Woodward. The lube oil filters are Honan-Crane and the fuel filters, Hilliard.

cents per kw. hr. And, since the load is increasing steadily, the improved load factor is expected to better these figures.

Natural gas is supplied to the plant by the local utility, and fuel oil is delivered by tank truck to five 15,000 gallon storage tanks. From here it is pumped through meters and two-element cellulose filters on its way to a 300-gallon elevated day tank inside the plant. From the day-tank the engines are supplied by their own fuel pumps. Lubricating oil is purified continuously in a one-element clay filter installed for each engine. During engine operation, oil is by-passed from the pressure side of the lube-oil pump and discharged, through the filters, to the sump. When the engine is idle, a small motor driven pump removes oil from the sump, forces it through the filters and back to the sump. The oil is cooled by passing it through shell-and-tube coolers. Combustion air is cleaned by 3-element impingement type filters located outside the building, and the exhausts are vented through silencers.

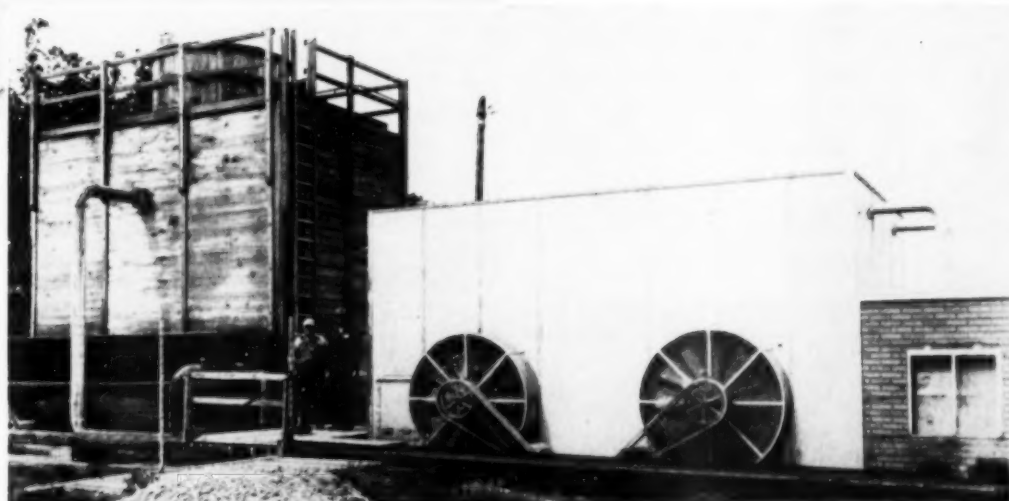
Two enclosed cooling towers with motor driven circulating pumps, and mixture valves thermostatically controlled by jacket-water temperature are the principle elements of the cooling system.



One pump is employed for each engine, but the piping permits alternate or combined operation of the pumps or cooling towers. City water is treated in a softener before it is used for makeup.

#### List of Equipment

Engines—Superior Engine Division, The National Supply Co.  
Generators—Elliott.  
Turbochargers—Elliott Buchi.  
Governor—Woodward.  
Fuel oil—Sinclair.  
Unloading pump—Roper.  
Transfer pump—Roper.  
Fuel meters—Buffalo Meter.  
Fuel filters—Hilliard.  
Level gages—Rochester Mfg.  
Lube oil—Socony Vacuum.  
Lube oil filters—Honan Crane.  
Oil coolers—Ross.  
Cooling tower—Diesel Service.  
Thermostatic controls—Fulton-Sylphon.  
Water softener—Elgin Softener.  
Air filter—American Air Filter.  
Exhaust silencers—Maxim.  
Exhaust pyrometer—Alnor.  
Air compressor—Worthington.  
Control panels—National Supply Co.  
Switchboard—Westinghouse.  
Voltage regulator—Allis-Chalmers.



The Diesel Service cooling towers. Fulton Sylphon thermostatic mixing valves regulate engine jacket water temperature.

Frank Swain, former plant manager checks electrical conditions at the control board. New Manager is M. D. Harvey.



TABLE II

#### Financial Statements for Auburn, Nebr.

	1948	1949
RECEIPTS	\$143,903.46	\$154,340.29
EXPENSES		
Salaries	22,100.91	24,656.31
Fuel	41,031.50	19,466.83
Supplies	17,042.91	13,258.89
Miscellaneous	500.64	324.47
Admin. & General	7,981.51	9,135.39
TOTAL	\$ 88,657.47	\$ 66,841.89
NET PROFIT	\$ 55,245.99	\$ 87,498.40

TABLE III

#### Comparison of Costs—Dual Fuel vs. Oil—Auburn, Neb.

##### Electric Generation with Dual-Fuel Engines Only Operating Data Month of December, 1948

Natural gas used	1,333.72 mcf.
Cost of Gas @ 23.75¢ per mcf.	\$316.76
Pilot Oil Used	1,246 gal.
Per Cent Pilot Oil	13.2
Cost of Pilot Oil @ 12.5¢ per gal.	\$182.75
Total Cost of Fuel Gas and Pilot Oil	\$499.51
Power Generated	132,150 kwh.
Fuel Cost per Kwh.—Dual Fuel	0.378 cents

##### Oil Which Would Have Been Required to

##### Generate Above Power With Oil Diesel

Engines @ 0.0765 Gal. per Kwh.	10,109 gal.
Cost of Above Oil @ 12.5¢ per Gal.	\$1263.63
Fuel Cost per Kwh.—Oil Diesel	0.956 cents
Monthly Savings Dual-Fuel Over Oil Diesel	\$764.12

##### Electric Generation with Dual-Fuel Engine and Oil Diesel Engines

##### Operating Data—Average Month (From Data Covering November and December, 1948 and January, 1949)

Natural Gas Used	3,571.15 mcf.
Cost of Gas @ 21.28¢ per mcf.	\$759.94
Pilot Oil Used	3,026 gal.
Per Cent Pilot Oil	10.6
Cost of Pilot Oil @ 13¢ per Gal.	\$393.38
Total Cost of Fuel Gas and Pilot Oil	\$1153.32
Power Generated—Dual-Fuel	307,368 kwh.
Fuel Cost per Kwh.—Dual-Fuel	0.375 cents

Oil Used—Oil Diesel Engines	10,916 gal.
Cost of Above Oil @ 13¢ per Gal.	\$1419.08
Power Generated—Oil Diesel	85,282
Fuel Cost per Kwh.—Oil Diesel	1.664 cents

##### Cost of Oil if Power Generated by

##### Dual-Fuel Engine Were Generated by

Oil Diesels	\$5114.60
Monthly Savings Dual-Fuel Over Oil Diesel	\$3961.28



## WHAT'S GOING ON IN ENGLAND

CONDUCTED BY HAMISH FERGUSON

### MWD OIL OPERATED TRANSMISSIONS

**S**INCE some description of the oil-operated reverse-reduction gearboxes fitted to the Union Barge Line towboat *Southern* was given in the March issue, it may be of interest to refer to some other applications of this well proved gear transmission which is manufactured in England by Modern Wheel Drive Ltd. Considering the powers which can be handled, these vary from less than 100 hp. up to 10,000 hp. in a single gear box. Designs are available to accommodate any number of engines from one to four and the gear reduction can be arranged to suit any individual requirements. By far the largest application to date has been in the marine field where diesels are employed, but steam and gas turbines can also be catered for and the makers are finding an increasing demand in the field of rail traction.

The modern tendency in marine practice has been towards multiple-engine drives for main propulsion. One of the most outstanding problems has been the method of transmitting the power from two or more medium or high-speed engines to the propeller shaft through a mechanism incorporating the following:

(1) A reduction ratio so that the most efficient propeller speed can always be maintained.

(2) Ahead and astern running while all the engines continue to run in the same direction of rotation.

(3) The necessity of being able to isolate quickly any engine from the power transmission at will while the remaining engines continue to drive the propeller.

(4) Quick, simple, smooth and reliable maneuvering. Multiple-propulsion has the following advantages:

(a) When only reduced power is needed, complete units may be shut off, thus ensuring considerable economy in fuel, lubricating oil and wear and tear when a vessel is operating on light duties.

(b) In the event of trouble with one engine, it can be shut down and the vessel be enabled to carry on without substantial loss of speed.

(c) Spare engines can be carried aboard en-

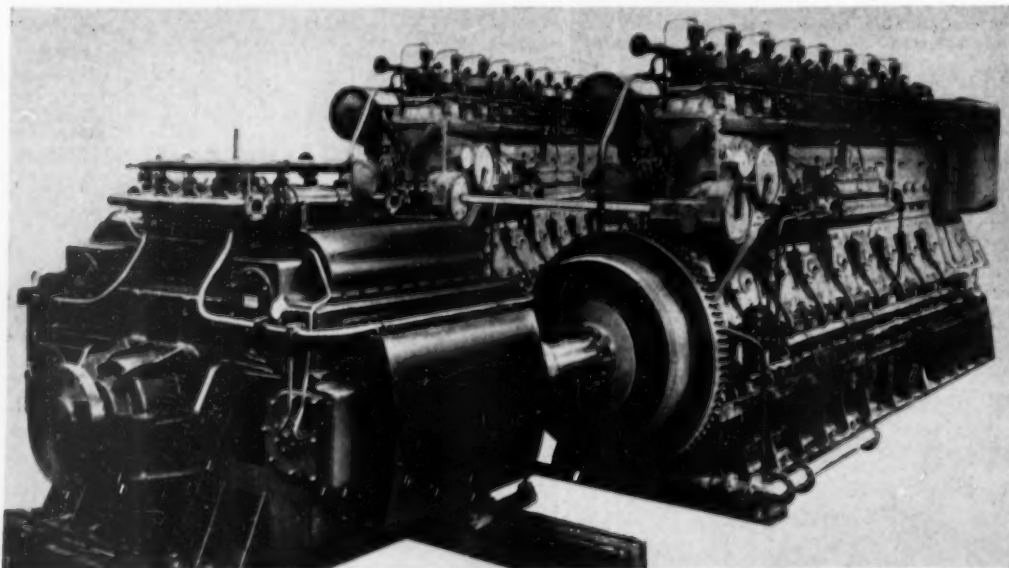
abling routine overhauls to be carried out while the vessel is in commission.

(d) The engines are not required to be reversible units.

In the case of all M.W.D. oil-operated transmissions, the ahead and astern wheels each incorporate an oil-operated coupling which consists of two inner and two outer members. The two outer members are carried and are free to rotate on the sleeve or hub of the two inner members, which in turn are carried on longitudinal splines on the secondary shaft. The gearing being in constant mesh, it follows that the primary shaft causes the outer coupling members to revolve on the sleeve or hub of the inner coupling members, but the motion cannot be transmitted to the secondary shaft until the inner members of one or other of the couplings are caused to engage with the inner faces of the outer members of that coupling and until, in fact, the neutral position is abandoned and either the ahead or the astern coupling is brought into engagement. Such engagement is effected by directing oil under pressure into the chamber between the inner members, which then slide axially on their splines until they engage the outer members, where they are maintained in working contact by the oil pressure until it is released.

Disengagement after release of the working oil pressure is ensured by the pressure oil also on the opposite face of the inner members, which returns them to their idling position. The pressure oil system consists of a pump, a by-pass valve, a control cock and ducts through which the oil passes at the correct volume and pressure to operate the couplings and to lubricate the working surface. The oil-operated couplings are engaged and disengaged by the simple and effortless action of turning the handle or lever of the control cock. This handle or lever on the control cock has three positions—ahead, stop, and astern. When the control-cock lever is in the stop position, the ahead and astern oil-operated couplings are disengaged and revolve idly, or when the control cock is in the ahead position, the ahead coupling is engaged and the astern coupling is disengaged, and vice versa. The operation is positive and instantaneous, the time taken

Modern Wheel Drive, Ltd. twin-engine oil-operated reverse-reduction gear with Polar engines. The installation is in the Suez Canal pilot boat, *Jean Mantelet*.





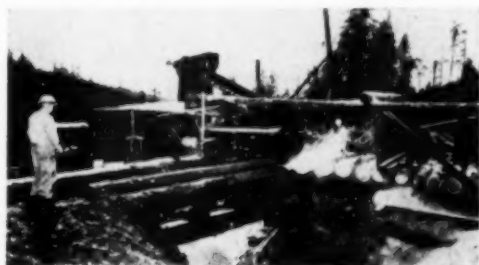
to operate from full ahead to full astern, and vice versa, being a matter of two seconds, and there is no possibility of more than one oil-operated coupling being in engagement at one time.

In certain cases, particularly where torsional vibrations from the engine crank shaft may be anticipated, the design incorporates a hydraulic coupling interposed between the engine and gear box. A large-sized transmission was recently inspected when on test at the maker's works. This takes the power from four 2,000 bhp. engines running at 920 rpm. and transmits it to a single propeller shaft through reversing gears having a ratio of 4.6:1.

Orders now in hand include gearboxes for two twin-screw ferries which are to operate in Canadian waters. The Yarmouth-Bar Harbour ferry will have a total power of 12,000 bhp. and the propelling machinery will consist of two sets of three Fairbanks-Morse engines, each developing 2,000 bhp. at 750 rpm. Hydraulic couplings will be incorporated and the reduction ratio will be 3.75:1 giving a propeller speed of 200 rpm. The Canadian Pacific Railway ferry of 6,300 bhp. will comprise two sets of two National Gas and Oil Engine Company's engines each developing 1,575 bhp. at 333 rpm. Again, hydraulic couplings will be used and the reduction ratio will be 1.6:1; a propeller speed of 200 rpm.

Modern Wheel Drive transmissions have found application throughout the world to the extent of over 7,000,000 hp. of equipment and there can be no doubt that the advantages claimed for the system have been amply proved.

#### Perilous Perch



Perched atop a ravine in Bear Canyon near Cinabar, Washington is a General Motors 4-51 diesel engine operating a log haul-in chain and cut-off saw for Alvin Taylor, logger and sawmill operator of Centralia, Washington. The engine is one of the first of Detroit Diesel Engine Division's new small diesels to operate in the lumbering industry on the West Coast. According to Mr. Taylor the small size and light weight of the engine facilitated its installation in its perilous "over-the-ravine" position made necessary because of limited space on the mountain ledge. Mr. Taylor is presently working a 400-acre tract in the mountains near Bear Canyon at the rate of 3,000,000 board feet logged and cut per year. He produces railroad ties and other rough lumber products. Evans Engine and Equipment Company of Seattle engineered the power installation.

#### GE Locomotive Rebuilding Service

A complete locomotive rebuilding and overhaul service has been established in Erie, Pa. by the General Electric Company's Locomotive and Car

Equipment Department. G. W. Wilson, the Department general manager, announced recently. This new facility will be in addition to the service shop facilities currently available to users of locomotives throughout the United States. General Electric maintains a network of 31 service shops throughout the country, all of which are engaged in the repair and modernization of transportation equipment. The new service is being set up to fill a need for a complete locomotive rebuilding service among industrial locomotive users and those railroads operating comparatively small fleets of motive power, Mr. Wilson explained.

"General Electric is extending its operations to give owners of thousands of G-E locomotives the same

fast, high-quality type of rebuild and overhaul service on locomotives as it has offered for many years on transportation motors, generators, and other electric equipment," Mr. Wilson said. The new program will include all kinds of heavy maintenance and overhaul rebuilding, modernization, conversion, and wreck rebuild work. New locomotive warranties will be issued to operators of locomotives that are completely rebuilt by GE.

**YOUR COPY OF DIESEL ENGINE CATALOG** in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

## FROM 100 K.W....

UNION Diesel generating sets are conservatively designed, carefully built and dependably rated. They provide more reliable power at lower cost. Installations both afloat and ashore throughout the world have proved that their use assure maximum, long-lived economy with minimum maintenance.

Applications include stand-by service with automatic controls as well as main line power source with high load factor.



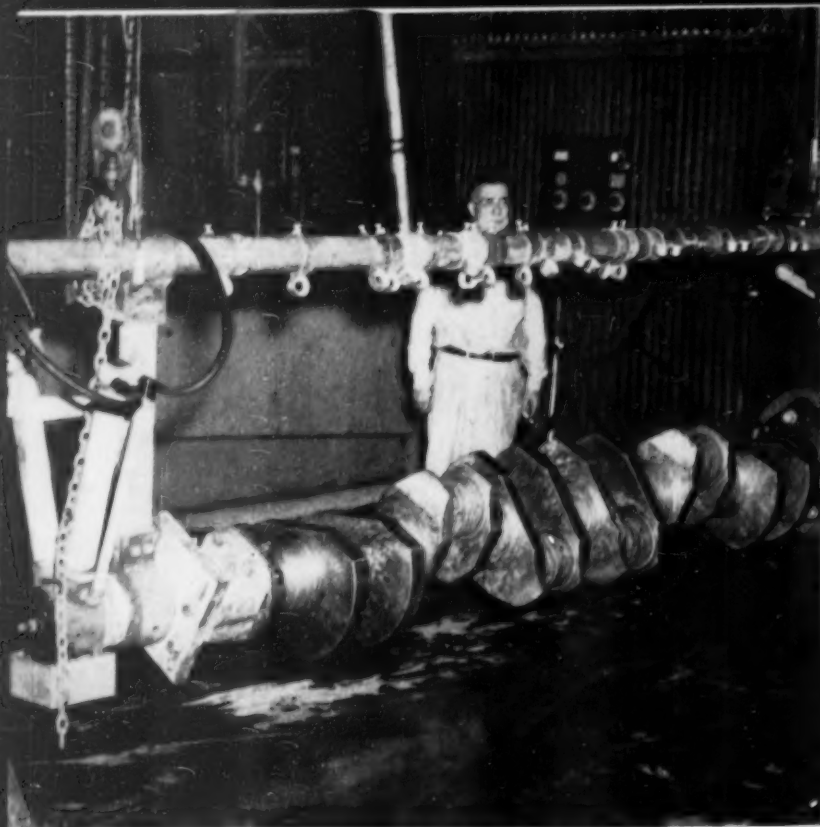
UNION Diesels are available to suit your requirements arranged as

Dual Fuel  
Full Diesel  
Sparked Gas

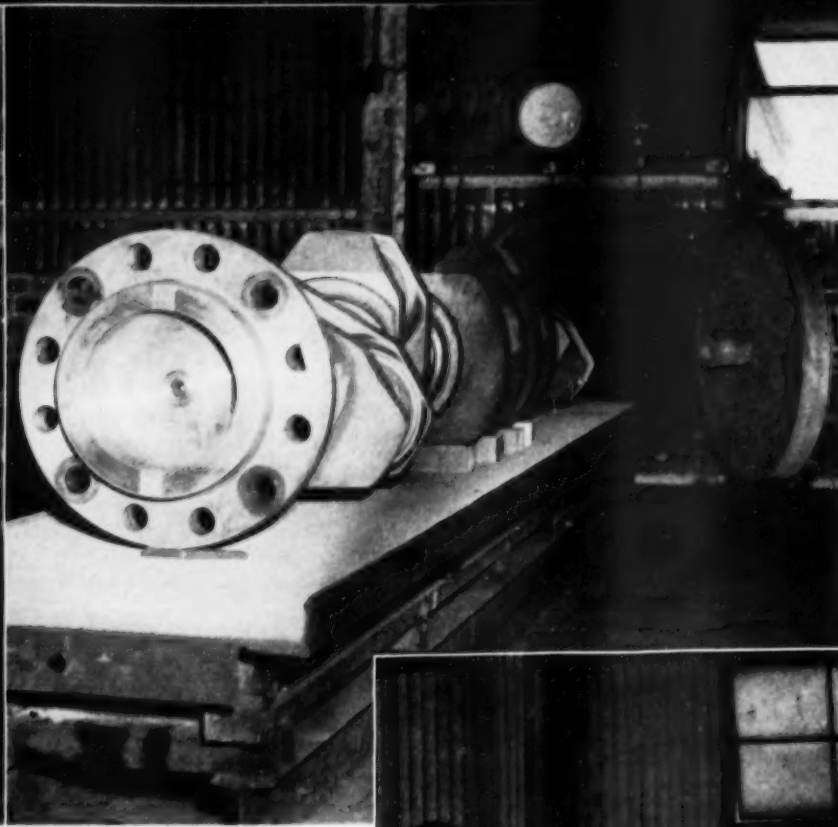
## ...TO 1250 K.W.

*The* **UNION DIESEL ENGINE Company**

2121 DIESEL ST., OAKLAND 6, CALIFORNIA, U. S. A.



A large diesel engine crankshaft set in the fixture preparatory to cleaning and anode set-up.



A shaft going into the automatic heat-treating oven after plating.

## HARD CHROMIUM PLATING OF DIESEL ENGINE CRANKSHAFTS

**An Interview With F. E. Lane of the Lane  
Plating Works, Dallas, Texas**

**T**HE Lane Plating Works was founded by F. E. Lane in Dallas, Texas in 1925. It was operated as a general job-shop for all around electroplating. In 1930 Lane had to expand—the plant was moved into larger quarters and that year he began to experiment and plate industrial or hard chromium. In 1937, Lane moved again to larger quarters and installed a larger hard chromium department. Here the plant did a great deal of work in all departments during World War II. They became well-known in the southwest for their hard chromium plating and served many large industries, including naval aircraft. On their return from World War II, Lane took his two sons into the plant with him. By 1949 they had to abandon job shop plating and devote most all their time to hard chromium and were again faced with securing larger quarters. In 1950 they built their present plant on a five acre tract near Loop 12 on the outer circle of the city of Dallas, Texas.

The present plant building is of concrete, steel and brick and has 20,000 sq. ft. floor space. It was designed and built for hard chromium plating and

engineering. While serving many large industries with all kinds of hard chromium plating and grinding, they have specialized in the plating and grinding of diesel engine crankshafts and aircraft crankshafts and propeller shafts. The plant is one of the largest chromium plants in the United States. It is built for heavy work—crankshafts up to and including railroad diesel engine shafts, large rolls, hydraulic rams, etc. More than 30,000 amperes are available for plating.

There are seven horizontal chromium tanks ranging from medium to 22 ft. long and two deep wells ranging from 12 ft. to 24 ft. deep by 34 in. ID. These wells are equipped with cranes for loading and unloading—also, with traveling anode equipment whereby a tube or pipe up to 20 ft. long may be hard chromium plated uniformly on the inside diameter. All departments are equipped with electric cranes with lifting capacities up to 10,000 lbs.

Their plating fixtures are of the horizontal rotary type for diesel crankshafts. They were made in their plant—will carry 10,000 lbs. or more, and



A large solid shaft being lowered into a 24 ft. well for plating. Lane Plating Works have two vertical wells and seven horizontal tanks.

they believe it to be the best in the United States. Their grinders are new; they have had to hold tolerances as close as .0003 on some of the aircraft crankshafts. Their magnaflux machine is a large and expensive piece of equipment and is the dc. type required by the U. S. Air Forces. It reveals the deep as well as the surface cracks—the demagnetizing machine is large and of the better type.



After many years of chromium work with the U. S. Navy and U. S. Air Forces, Mr. Lane realized the necessity and great value of proper heat-treating which should be applied to diesel engine crankshaft work. They have installed one small and two large heat-treating ovens, all automatic. Their larger oven will take a crankshaft 18½ ft. long; it is electrically controlled, temperature recording and continuous air circulating.

Let us follow a diesel engine crankshaft through the Lane Plating Works in order to thoroughly understand the process. After the shaft is received and properly recorded in the office, it goes to the cleaning department for degreasing and cleaning, then it is magnafluxed and carefully inspected for cracks. After demagnetization, it is pre-ground. This pre-grinding of a shaft is important to the life

of the subsequent chromium plate. The shaft is again cleaned but not rinsed.

It is now gone over with a micrometer and recorded. The engineering department figures the square inch area of main journals and rod journals and determines the ampere rates to be used. The same department makes the anodes and shields to fit the rotary machine. The shaft is then installed in the rotary machine where it is centered and securely fastened. The anodes and shields are installed and connected to the machine and shaft. The shaft is then rinsed, acid dipped, rinsed again and then placed in the etching tank. Reverse current is applied while the shaft is rotating until all the journals are properly etched.

The fixture and shaft is subsequently transferred to the plating tank where it is adjusted to the correct depth and connected to the plating source. The rotary machine is turned on and the pre-determined plate is accomplished. This will be several thousandths more than the standard size of the journal. The current is continued without break and the temperature of the solution is maintained at proper temperature whether it takes steam to heat or cold water to cool. After plating, the shaft is inspected, miked and thoroughly rinsed. It is then placed in an oven and heat-treated for three hours at the proper temperature to remove hydrogen embrittlement incurred while plating.

After the shaft has been allowed to properly cool, it is again sent to the grinding department where it is precision ground to standard size. Cleaning demagnetization and magnafluxing complete the operation. It is oiled and crated after inspection. Special hardened shafts are given a special heat-treating before grinding and plating as well as the regular heat-treating after plating.

Hard chromium plating is the hardest and most exacting plating known to man. There is no substitute for experience. Chromium got a black eye at first with most of the oil companies. That was due to inexperience in plating technique and especially the lack of any heat-treating whatever. 90% of shaft breakage was on specially hardened shafts that were plated with no heat-treating done either before or after plating. There are only 5 or 6 plants specializing in chromium plating diesel crank-

shafts. Why not visit and inspect the plant you plan to favor with your crankshaft work. It may pay off better than you think.

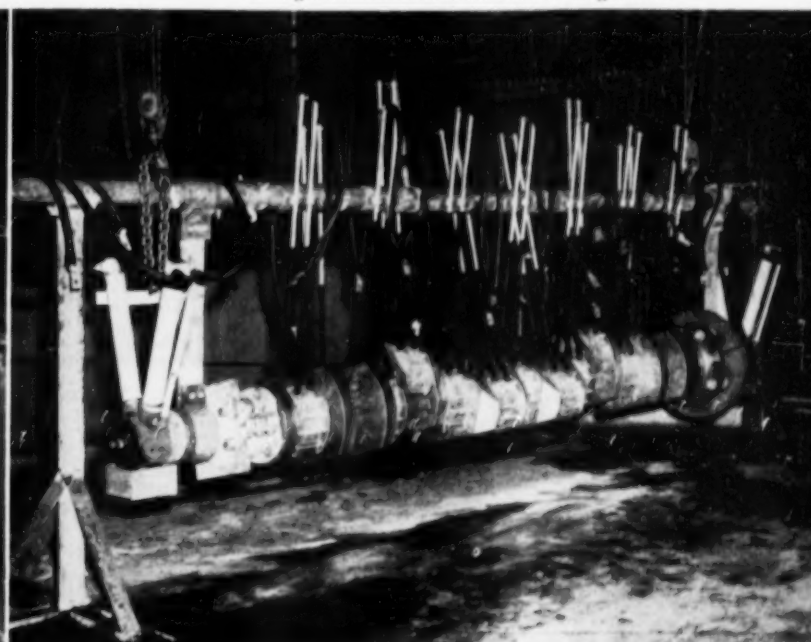
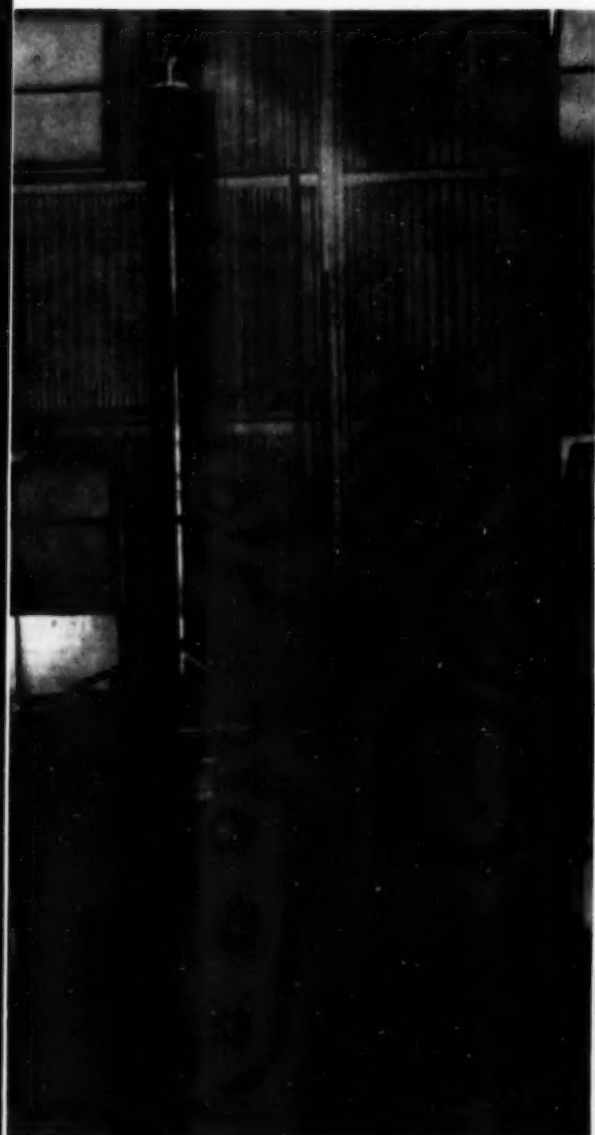
Chromium needs no defense today. It has proven its inestimable value in all fields of industry where it is feasible or needed. The Government itself by constant use, study and experiment has done more to prove the value of chromium plate than any other one source. Chromium is next to the diamond in hardness—(Rockwell C 66-70)—will stand high temperatures, melting point 3500° F. Has high corrosion resistance—is unaffected by alkalis, organic acids and most corrosives except hydrochloric acid. Has great resistance to sticking, pick-up or galling. Has extremely low coefficient of friction. With good cleaning and plating technique it has great adherence to most metals. A crankshaft properly ground, properly plated, properly heat treated and properly installed in its engine with correct alignment will give you the hardest, slickest and longest wearing bearing surfaces known. It should outlast from 3 to 5 times the life of an unplated shaft under same conditions, and the savings in fuel cost due to less power needed to operate under same load could, in time, pay for the plating cost, not including the savings in engine overhauls. The larger the shaft the more saving in fuel cost due to the difference in friction of chromium plate.

Lane Plating suggests that on first engine overhaul, the crankshaft be ground and chromium plated back to standard; thus eliminating or retarding future wear on journals and eliminate the costly stocking of undersize bearings. They also predict that in the not too distant future you will be able to buy new crankshafts chromium plated, especially in the larger sizes such as railroad shafts.

Mr. Lane says: "Primarily, our business is hard chromium plating. We have done it for 24 years and we are still learning about that magic metal, the King of all Plate, Hard Chromium." Lane is approved for chromium plating and grinding by U. S. Air Forces, U. S. Civil Aeronautics Administration and Pratt & Whitney Aircraft Corporation. Mr. Lane was instrumental in establishing the Dallas-Ft. Worth Branch of the American Electroplaters Society and served as its first president. His company is also a sustaining member of the American Electroplaters Society.

A 22 ft. glass-lined chromium tank for crankshaft work.

A 112-inch long railroad diesel crankshaft being rebuilt to original dimensions at the Lane Plating Works.





### Manager of St. Paul Branch



H. E. Hanson

Fairbanks, Morse & Co. has announced the appointment of H. E. Hanson as manager of their St. Paul, Minnesota, branch house. "Ed," as he is known by his many friends, was graduated from the University of Minnesota with the degree of Bachelor of Mechanical Engineering. In the same year he joined the Fairbanks-Morse organization at St. Paul as a departmental assistant. In 1937 he became a diesel field engineer and in

1942 diesel department manager, which position he held until his recent promotion to manager of the St. Paul branch. L. A. Weom, former manager of the branch, has been transferred to the Beloit, Wisconsin, Works of the company as manager of materials and schedules.

### Specification Bulletins on P&H Diesels

A new series of 2-color bulletins covering the full line of P&H diesel engines is announced by Harnischfeger Corporation, Diesel Division. Printed on two sides of an 8½ in. x 11 in. sheet handy for filing and reference purposes, the new literature gives condensed information and specifications on this line of 2-cycle diesel engines. There is a separate

bulletin for each diesel with pictures of each model or engine and power unit. Marine diesel engines are covered separately. All models, from 20 to 138 horsepower, 2, 3, 4 and 6 cylinders, are included in the new series of specification bulletins. A complete set may be obtained by writing Harnischfeger Corporation, Diesel Division, Crystal Lake, Illinois.

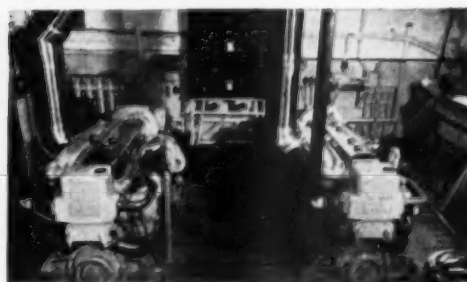
### Diesel Electric Locomotive Saves \$600 a Month



Since replacing two 50-ton steam locomotives, this General Electric 45-ton diesel-electric has enabled the Crossett Chemical Company of Crossett, Arkansas to reduce operating costs by approximately \$600 a month. According to Mr. H. Quinn, superintendent of the Crossett plant: "Not only is there a tremendous saving in operating costs but in labor costs as well. The diesel-electric operates much faster so that we do not have to work overtime, as we had to before, to finish the day's work."

Crossett makes charcoal, acetic acid, methanol, and wood tars at their wood distillation plant. Normal load-weight handled by the G-E 45-tonner around the retorts is from 600,000 to 700,000 pounds. The locomotive is also used for miscellaneous switching jobs around the yard. Because of the nature of the material handled, the diesel-electric, which throws no sparks, has proved much safer.

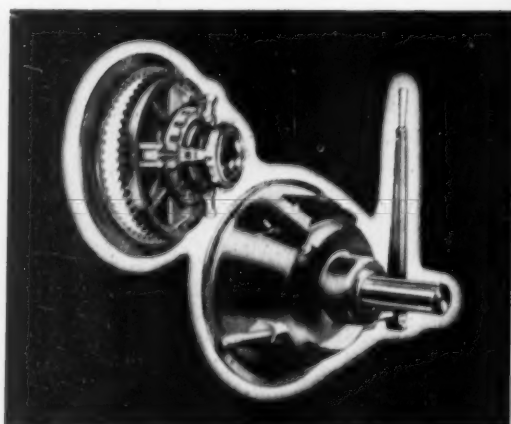
### The "Stella Polaris"



Main propulsion is provided for the *Stella Polaris* by a pair of General Motors 6-110 diesels rated at 275 hp. each with GM hydraulic clutch and reduction gears.

The *Stella Polaris*, a 112 by 21 ft. yacht whose home port is in Chicago, Ill., was recently re-powered at the boat slips of the Miami branch of the Florida Diesel Engine Sales General Motors Corp. Built by Methes Yacht Co. in Camden, New Jersey in 1930 and originally powered with two Winton diesels, she was recently re-powered with two model 6-110 General Motors diesels rated at 275 hp. with GM hydraulic clutches and 3:1 reduction gears. The new diesel installation provided an increase of two knots over her old speed. This famous yacht has made numerous cruises to the Mediterranean area and to South American ports. Installation in the engine room also included two Delco Remy 20 kw. generating sets powered by model 2-71 GM diesel engines.

## ASSURING SMOOTH EASY OPERATION



ROCKFORD CLUTCHES are carefully adjusted and accurately balanced to prevent drag or centrifugal force from affecting their smooth running operation. An electronic gauge checks the balance of each ROCKFORD CLUTCH, within extremely close limits, before it passes final inspection.

#### SEND FOR THIS HANDY POWER TRANSMISSION BULLETIN

It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every development engineer will find help in this handy bulletin, when planning new or improved products.

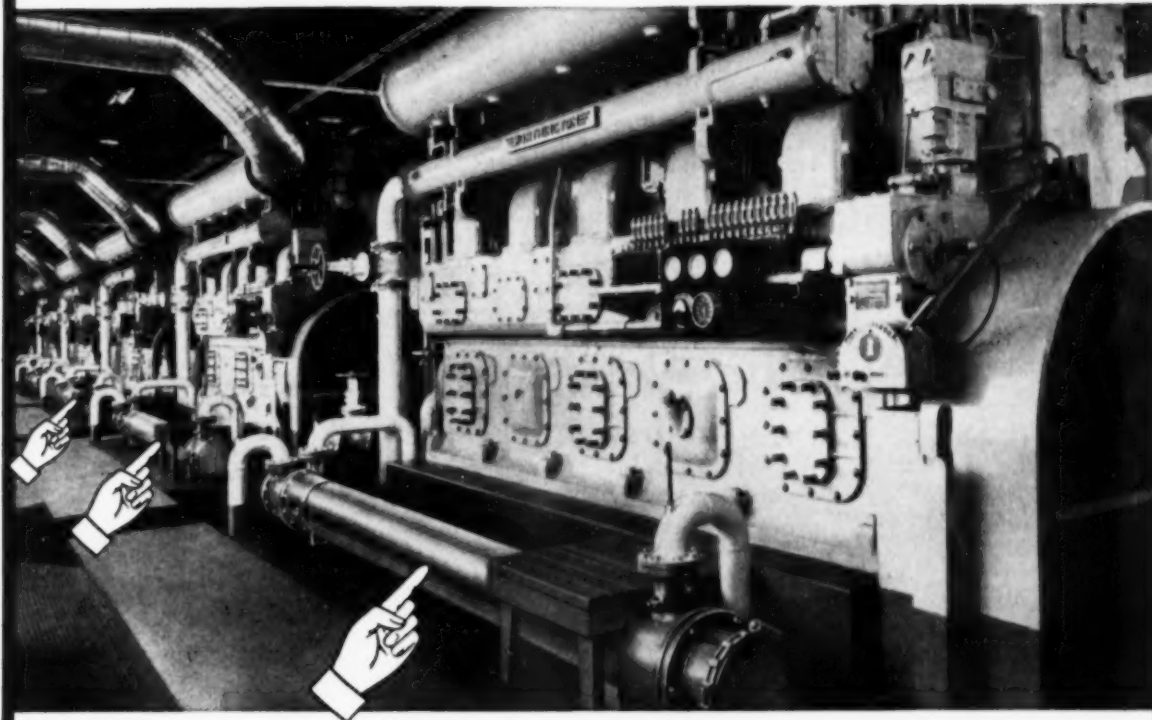


**ROCKFORD CLUTCH DIVISION**  
**Borg-Warner Corporation**  
1321 Eighteenth Avenue, Rockford, Illinois

## ROCKFORD CLUTCHES



## cooling the lube oil for 10 Worthington Compressors on this 423-mile gas pipeline



### ...ROSS EXCHANGERS

Moving 167,000,000 cu. ft. of gas per day through a 423-mile, 24-inch line is the job assigned El Paso Natural Gas Company's Navajo Station. Carrying the load are 10 Worthington Uniflo UTC-165 Gas Engine-Compressors with a combined rating of 7900 hp at this elevation of 6800 ft.

In virtually continuous operation — bearings, valve gear, pistons, power and compressor cylinders must receive constantly an ample supply of properly cooled lube oil. *And they do!* Each of the Worthington units is served by a Ross Type CP Exchanger. Safe, dependable cooling is assured at all times.

Top-rated for both thermal efficiency and ruggedness, Ross Exchangers work side-by-side with numerous types and makes of prime equipment in the oil and gas industry . . . in fact, in every industry . . . to cool lube oil, jacket water and hydraulic fluid.

Pre-engineered and fully standardized Ross Type CP Exchangers are assembled from mass produced parts and sub-assemblies to fulfill individual requirements — promptly.

More information is in Bulletin 2.1K1. Write.

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### "Silent Power" Mufflers

A real desire to aid the trucking industry in solving an important problem is the only "secret" of GMC Truck's new Silent Power Exhaust system, P. J. Monaghan, general manager of GMC Truck and Coach Division, said recently. The new system, standard at no extra cost on all 1954 models now in production, has brought a flood of favorable comment and inquiries from truck operators and newspapers throughout the country.

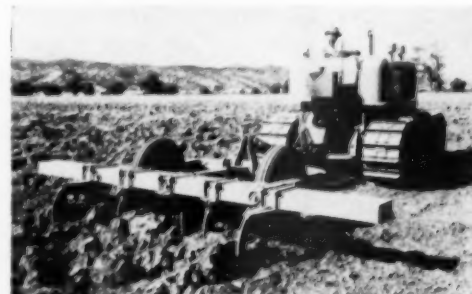
"Since we first announced Silent Power at the recent American Trucking Association Convention in Los Angeles, everyone wants to know what

'revolutionary principle' is used in its construction," Monaghan said. "Our principle is not revolutionary in any way. Engineers know it takes increased muffler volume to quiet exhaust noise without increasing back pressure on the engine but a large muffler costs more to produce. For years, the cost factor has been shrinking the size of mufflers throughout the industry until in some cases trucks have virtually a tomato can trying to muffle the exhaust of a powerful engine.

"GMC decided to reverse this trend by introducing larger mufflers made of heavier steel, and make them standard on all models. Muffler sizes have been increased in 1954 models by as much as three

and one-half times," Monaghan said. "We believe the quieter exhaust system will aid truck operators in improving relations with the public, which has shown increasing resentment against truck noises," Monaghan concluded.

### Reclaiming Land




Old and worn-out land is being reclaimed in many sections of the country for further productivity with the help of diesels in the form of crawler tractors. An HD-15 dieselized 27,850-lb. crawler tractor owned by Paul Stephens & Son of Esparto, California, has been deep chiseling 450 acres of such land with a No. 600 tool carrier and five deep chisels that penetrate 16-inches. It is estimated that the land under cultivation had, during the past 75 years, been plowed to depths of only 5 inches. To benefit from irrigation and fertilization and return its productivity, it has been necessary to break up the old plow plan of this excellent but heavy clay loam soil. The 109 hp. of the HD-15 proved sufficient power to permit the job to be done quickly and efficiently.

### Another Tea Kettle Goes

A diesel locomotive replaced a stubby steam switcher recently at the Bathurst Power and Paper Company plant at Bathurst, N. B. After nearly 30 years of service, a steam locomotive built by Montreal Locomotive Works, Ltd., bowed out in favor of a 660 hp. diesel workhorse, also built by Montreal Locomotive. J. G. Chalmers, administrative vice-president of the Bathurst firm, stated that the growth of the company's operations made necessary the switch to the more economical and powerful diesel. Bathurst Power and Paper operates a single locomotive on three miles of interplant railroad. Montreal Locomotive, which built its last steam locomotive in 1950 and has been manufacturing diesels since, shipped the new unit last week. It is designed for heavy duty switching. It is 30 feet long and weighs 97 tons.

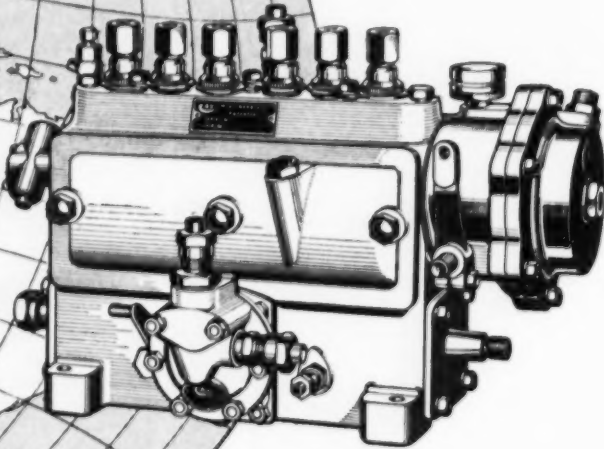
### Industrial Sales Representatives

The Jameson Company of St. Louis has been appointed industrial sales representative of the St. Louis district according to a statement by Carlton H. Winslow, vice president of sales, Cuno Engineering Corp. The St. Louis territory includes southern Illinois, all but a portion of western Missouri and small areas of eastern Kentucky and Tennessee. Mr. Jameson served as technical adviser to the Navy on Cuno filters during the war and since then has been a sales engineer with the home office.



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**Fuel Injection and Electrical Equipment**



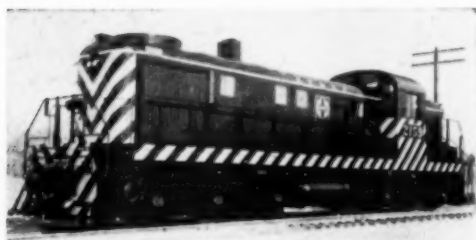
## Regional Symposium

A regional symposium on diesel engine and compressor intake air cleaning will be held at the American Air Filter Co., Inc., 215 Central Ave., Louisville, Ky. on April 13th. The meeting will be sponsored by the Diesel Engine Manufacturers Assn. and American Air Filter Co., Inc. for college instructors, DEMA members and other persons interested in the subject.

AAF sales and research engineers will speak on intake air filter design, performance and application and a panel discussion on the subjects that were covered will conclude the program. Panel members will include: O. H. Moore, Dir. Research, Tennessee Gas Transmission Co.; Leo Brinson, Asst. to Ch. Engr., Nordberg Mfg. Co.; C. J. Kramer, Ch. Engr., C. Lee Cook Mfg. Co. and Arthur Nutting, Vice President of Engineering, American Air Filter Co.

Anyone wishing to attend may register by writing to C. C. Sowerby, manager, Engine and Compressor Products, American Air Filter Co.

## Alco Locomotives For Santa Fe



Five new six-motor 1600 hp. diesel-electric locomotives, built by the American Locomotive Company at Schenectady, New York, are now in 'round-the-clock freight and switching service on the Santa Fe Railway. Weighing approximately 170 tons each, the locomotives are about 56 feet long and have a 42-foot wheel base. They have a maximum speed of 65 miles per hour. The all-purpose locomotives are equipped with two extra motors to provide greater pulling power. They are equipped with multiple unit controls so that two or more units may be operated as a single locomotive of greater horsepower. Electrical dynamic braking enables engineers to slow down trains smoothly without the use of brakes, saving wear-and-tear on wheels and freight loads.

## Illustrated Engine Bulletin

Lister stationary diesel engines, five models of 9 to 54 bhp. with one to six cylinders (3.75 x 4.5 in.), are described in a new 8-page illustrated Bulletin 5303 by The National Supply Company, Engine Division, Springfield, Ohio. Design features, specifications, and dimensional diagrams are included.

## New Class of River Towboat

A new class of river towboat soon will make its debut on the waterways of this district. Dravo Corporation has announced it has started construction of five 70-foot long diesel vessels especially designed for towing coal and sand and

gravel barges, and shuttling cargo barges. The towboats pack substantial power although they are relatively small in size. They will be equipped with many of the features of larger towboats, including pilothouse control of the main engines. Reverse-reduction gears permit reversing the direction of the boat without reversing the engines.

Two diesel engines will power each vessel. Total rated output of the engines amount to 580 horsepower. The twin propellers, four feet, three inches in diameter, are to be enclosed in Kort Nozzles to give the vessels additional pushing power and maneuverability. The new vessels will have no smokestacks. Exhaust from the diesel engines is to be discharged through small pipes. Access to

all quarters, including the pilothouse, will be by internal passageways so the crew will not have to go outside during inclement weather. Tanks for fuel oil have a capacity for 12 to 14 days of continuous operation. Water for drinking and cooking will be stored in a 2000-gallon tank. The new vessels will be 70 feet long, 20 feet wide and eight feet deep, operating at 6-foot draft.

**YOUR COPY OF DIESEL ENGINE CATALOG** in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

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*Luber-finer*  
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The Efficiency  
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## DON'T BE MISLED BY PRICE ALONE!

There is NO substitute for DIESELPAK'S Patented Filtering Process for H. D. Compounded oils AT ANY PRICE. The DIESELPAK cleans more oil faster—keeps it CLEAN longer—and gives more service and better engineered protection than any other filtering element. It PAYS to get the BEST!

### ✓ PROTECTS ENGINE

The DIESELPAK is designed to remove not only ABRASIVES but also CONTAMINANTS such as moisture, carbon, acid, etc. from oil, and is engineered to keep the filtering media and the removed contaminants from migrating back into engine. The DIESELPAK assures continuous protection that reduces engine wear and maintenance costs far beyond that possible with other types of filter elements.

### ✓ EXTENDS PERIODS BETWEEN DRAINS

The DIESELPAK collects and holds even the most finely dispersed contaminants without affecting or removing compound additives from the oil. A glance at the dip stick will show that the oil is CLEANER—symbol of better lubrication and longer oil life enjoyed only by Luber-finer users.

### ✓ TAKES LESS OIL

The DIESELPAK because of its engineered construction requires 2 to 4 quarts less oil than spongy substitute filter elements being offered for use in the Luber-finer housing. This is an additional saving enjoyed when using the DIESELPAK.

### STANDARD of the INDUSTRY SINCE 1936

Since Luber-finer was first introduced to the public in 1936, it has gained worldwide acceptance by millions of satisfied users everywhere. Luber-finers are approved by major oil companies and petroleum engineers. Luber-finers are standard or optional equipment on America's foremost stationary engines, diesel trucks, tractors and earth-moving machinery.

### LUBER-FINER PACKS AVAILABLE:

**1. REFINING PACK**—Introduced to the public in 1936 for use with straight mineral oils, fuel oils and inhibited industrial oils.

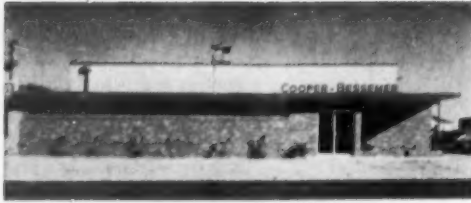
**2. DIESELPAK**—First made available in 1941, the DIESELPAK was primarily designed for use with H. D. detergent compounded oils under the direction of Dr. Ulric B. Bray, B.S., Ph.D., F.A.I.C., internationally known Petroleum Chemist. The DIESELPAK has also achieved outstanding results when used with fuel oils and straight mineral oils.

**GET THE  
FACTS  
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Why take chances with expensive equipment? **WRITE TODAY** for complete information on what to look for before you buy either Filters or Replacement Packs—see how you can save many dollars and hours in maintenance.

**LUBER-FINER, INC., 2512 S. Grand Ave., Los Angeles 7**

## Odessa Office



Expanded field service facilities are housed in this unique brick building constructed by Cooper-Bessemer at Odessa, Texas. Under the direction of A. W. Abel, branch manager, the new structure houses 1,715 square feet of office space and 3725 square feet of warehouse area. Serving the ware-

house facilities is a two-ton traveling crane for expediting delivery of heavy engine and compressor parts to the Texas area. The new structure is part of Cooper-Bessemer's program to form an even closer working relationship between the factory and users of diesel and gas engines and compressors, according to Stanley E. Johnson, Cooper-Bessemer's vice president in charge of sales.

## Diesel-Electrics for Mexico

Shipment of an order for 15 diesel-electric locomotive units to the National Railways of Mexico was started recently by the Montreal Locomotive Works, Ltd. William G. Miller, executive vice-president, announced. The first two-unit, 3200-

horsepower streamlined road locomotive was shipped to Mexico over six Canadian and U. S. railroads. It will be put into fast freight and passenger service between key Mexican cities. Shipment of other locomotives on the order will be completed in March, Mr. Miller said.

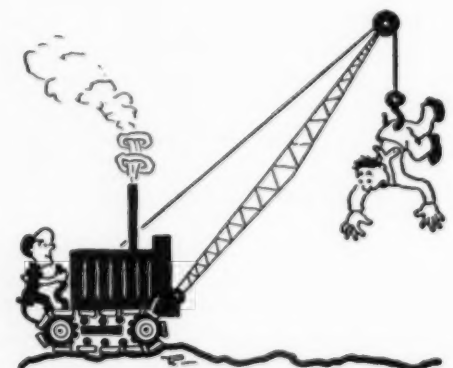
"This is MLW's third export order since we started building diesel-electrics on a production basis in Canada in 1948," he stated. MLW supplied 20 diesels to Australia in 1952 and 48 units to Brazil in 1953. Mr. Miller said the Mexican diesels are part of a railroad modernization program being carried out under the direction of Senator Roberto Amoros, General Manager of the National Railways of Mexico. Weighing 130 tons, twelve of the 1600 hp. locomotive units are geared for 65 mph. speeds. They are equipped with steam generating equipment designed to heat passenger trains in cold weather. The three other locomotives on the order are 120 ton, 1000 hp. all purpose types, for use in freight, passenger and yard switching service.

## Dieselized Fire Boat



Patrol No. 7 is one of five busy patrol boats operated by the City of Seattle to police its waterfront, regulate harbor traffic and help fight waterfront fires. The craft is shown in Seattle harbor during a test of pumping equipment with Chief Harborman J. A. Burns at the wheel. The craft is a converted Army T boat 65 feet in length with a beam of 16 feet. It is completely dieselized. A General Motors 6-110 diesel, recently installed, gives her a cruising speed of nine knots at 1000 engine rpm.

Most patrol work, however, is done at about six knots. The engine turns a 43-in. x 34-in. wheel through 3:1 reduction. The craft is equipped with an eight-inch DeLaval centrifugal pump driven by a General Motors Series 71 diesel. Using three monitors, 2000 gallons of water per minute can be delivered at a pressure of 90 pounds. The new propulsion unit was installed by the Evans Engine & Equipment Company of Seattle.



**NEW!**

**Quincy**  
COMPRESSORS WITH  
**safe-Q-lube**

New Model 350 with safe-Q-lube is a two-stage air-cooled unit designed for diesel applications. The Model 350 has a 6" & 3 1/2" bore x 3 1/2" stroke and a 51 cu. ft. piston displacement. Maximum continuous pressure is 200 p.s.i., maximum intermittent is 350 p.s.i.

## GIVE YOU MORE DEPENDABLE COMPRESSED AIR FOR:

- DIESEL STARTING      • AUXILIARY AIR SUPPLY

Quincy Compressors are now equipped with New safe-Q-lube to automatically open the intake valve—unload the compressor—whenever the lubricating oil is low. When the compressor is unloaded, lack of air signals operator.

Safe-Q-lube also operates Quincy's Patented Loadless Starting which protects motor and drive from starting overloads. And safe-Q-lube does it with 62% fewer parts for lower maintenance and replacement.

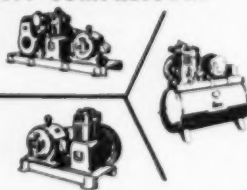
Write for details on new Model 350 and other Quincy units with safe-Q-lube for diesel service. Write Dept. K-36, Quincy Compressor Co., Quincy, Illinois.

## THE MAKERS OF THE WORLD'S FINEST COMPRESSORS

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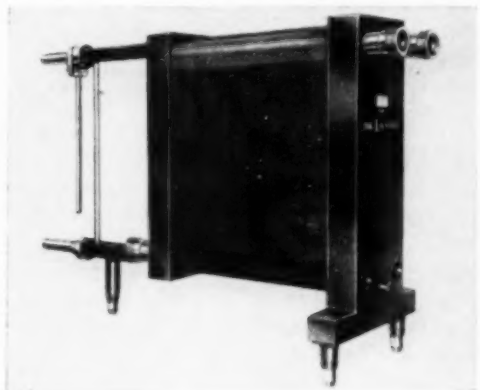
## Bulldozer Boat



A new steel bulldozer boat capable of moving bundles of 25 to 35 logs at one time in log-rafting operations has been delivered to the Ketchikan Pulp Company at Hollis, Alaska. The new craft designated as the KP 12 will operate in waters off Prince of Wales Island near Hollis and will help speed up the supply of timber to the company's new pulp mill at Ketchikan. The company already has two such boats in operation and another unit is soon to be added. Designed by H. C. Hanson, Seattle naval architect and built at Bellingham, Washington by the Weldit Tank and Steel Company, the new boat is constructed of  $\frac{3}{8}$ -in. steel plating. It is 16 feet long, has a beam of eight feet and a draft of 34 inches.

Power is supplied by a General Motors 4-51 small-boat diesel engine turning a 24-in. x 28-in. wheel through 2 to 1 reduction gears. In addition to providing power for pushing and the maneuverability required for "herding" logs, the use of this diesel eliminates the danger of explosive fumes aboard. This is an important safety feature for an operator confined to a boat of this small size, company officials reported. The company is presently logging in the Tongass National Forest area. Timber is transported to Hollis where it is rafted and towed to the new mill at Ketchikan.

## Announces New Plate Heat Exchanger



The De Laval Separator Company is featuring a new plate heat exchanger which is especially well adapted to a virtually unlimited number of industrial process applications, wherever heating, cooling or regeneration are required. De Laval claims high efficiency and lower operating costs for the new equipment because of the basic advantages incorporated into its design, construction and operational characteristics. Outstanding among the features of the De Laval plate heat exchanger are the plates themselves. Pressed from extra heavy stainless steel stock, and including a deeply corrugated surface, they resist distortion and are actually made to withstand higher than average operating pressures. The corrugated design results in high

velocity and extreme turbulence of the liquid. The heat transmission coefficient is unusually high.

Gasketing is such that all gaskets may be replaced in the user's plant without returning the plate to the factory. The design is such as to permit thorough and effective "in-place" flush cleaning. In every detail the De Laval plate heat exchanger has been designed to comply with all sanitary requirements. Liquids cannot leak between the plates nor mix with the cooling or heating medium. Cooling, heating and regeneration are readily accomplished, simultaneously, in the various sections of the unit.

Important to production engineers is the fact that because the plates are invertible, the plate heat ex-

changer may be altered from time to time to adapt it to changes in the operation. Inlet and outlet parts in the plates can be varied without the use of new or extra plates. Proper tension of the plates in the press, for maximum gasket life, can always be obtained because of the indicator marks stamped on the tightening bars. Easy tightening of the plates in the press and uniform pressure on the plates are obtained by the two-point tightening arrangement.

Close temperature differential or "split" is assured by use of the De Laval vacuum-steam heating system with the heat exchanger. However, the De Laval hot water set can be furnished, if desired. De Laval Plate Heat Exchangers are furnished in a wide range of sizes, models and capacities.

# more horsepower a problem?

## less weight per horsepower a problem, too?

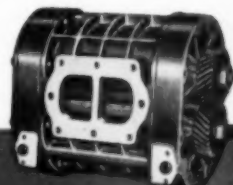
There's an easy way to keep pace with the race for more engine horsepower... without adding weight per horsepower, without sacrificing valuable space. Specify *Miehle-Dexter Superchargers*. You'll register a big gain in horsepower—up to 50% or more—and the additional investment in equipment will be far less by comparison with other methods.

## MIEHLE-DEXTER SUPERCHARGERS

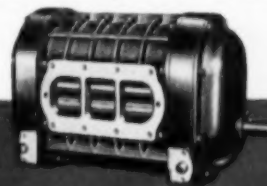
are engineered to match  
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And when you put M-D Superchargers on your engines you're assured of efficient operation plus long life and low maintenance service. Exclusive M-D features make this possible. Result: dividends in fuel economy and maintenance costs.

On small jobs as well as large, M-D engineers will be glad to work with you—to help you get the exact size and type of supercharging equipment for your purpose. Write for technical brochure with specifications and performance data.



Typical direct driven, flange mounted M-D Supercharger. Develops 350 c.f.m. at 10,000 r.p.m. Other models with capacities to 4,000 c.f.m. available.



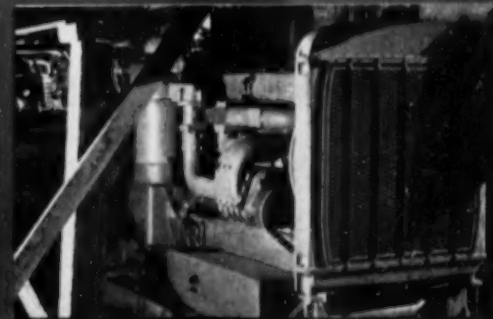
Direct driven, port mounted, Model 17100. Maximum 920 c.f.m. at 7000 r.p.m.



Belt driven, port mounted Model 15111 develops 1250 c.f.m. at 4000 r.p.m.



Supercharger at an Arizona pit mine expert big, fast-moving M-D supercharged Diesel trucks climb steep grades with power aplenty... sharply cut maintenance costs in moving overburden.



Supercharged Diesel power pays off in this rock crushing plant. The M-D Supercharger puts 50% more horsepower in the engine... reduces weight per horsepower by 50%. Easy portability.



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DIVISION OF THE DEXTER FOLGER COMPANY  
100 FOURTH STREET RACINE, WISCONSIN

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**\*FIRST LINE**

*Extended-Surface*

## HEAT EXCHANGERS

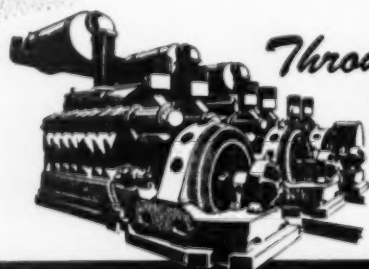


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*\* Aerofin makes extended heat surface exclusively — not as a by-product, not as a side-line.*



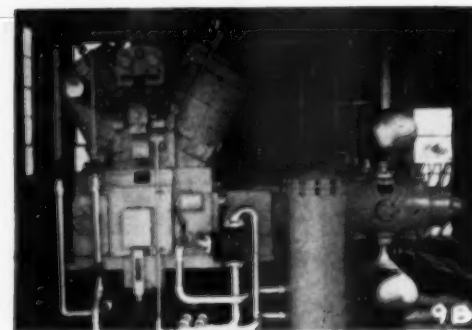
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advertised fan system apparatus. List on request.*

## Temperature Control



A 2 1/2-inch Amot thermostat in the lubricating oil line of the Model 6SVG Ingersoll-Rand 400 hp. compressor. Just to the right of the Amot (center) is a Peco full-flow filter.

An interesting application of Amot-type thermostats is on the Arkansas Louisiana Gas Company installation of a Model 6SVG Ingersoll-Rand angle compressor of 400 hp. The installation is at Sligo Field, southeast of Shreveport, Louisiana. The installation consists of 2 1/2-inch Amot thermostat on the lubricating oil line for control of the lube oil temperature, and a 3-inch thermostat of the same type on the jacket water line for water temperature control. The compressor is a Beaird packaged unit.



The 3-inch Amot installed on the jacket water line to control temperature of the Ingersoll-Rand compressor.

Increasingly, this type of thermostatic control is being used because the adjustment cannot be changed by the operator. It is set at the factory to fit the designed specifications of the equipment on which it is to be installed.

The desirability of the Amot-type of thermostatic control lies in the fact that it is a simple unit which is connected directly into the line. There are no external bulbs and lines with external adjustments. The element is not sensitive to pressure and will maintain proper temperature conditions regardless of pressures encountered on the line.

## Meeting and Exhibit

The time is drawing closer to the 1954 Kansas City Convention of the Oil and Gas Power Division of the ASME. The Muchlebach Hotel will play host to the convention June 14 to June 17. This important meeting is drawing widespread interest and attention from a large number of engineers. It is anticipated that attendance will far exceed that of previous conventions. Represented will be operators of large diesel plants such as utilities, municipalities, pipeline pumping stations and the large engine builders themselves. For information regarding availability of exhibit space, contact Joseph Clark, c/o ASME, 29 West 39th St., New York, New York.

## Opens Division in Los Angeles

Howard Foundry Company, Chicago, is opening a new "lost wax" precision investment casting division in Los Angeles. Close tolerance, complex ferrous castings requiring little, if any, machining, are to be produced. The new division will be staffed by personnel from the company's new Milwaukee plant, now in full production, although additional building expansion won't be completed until early April. The added production area will house a new type titanium casting furnace for the first commercial operation of its kind by the company's new subsidiary, Titanium Casting Corporation.

West Coast precision facilities will be adjacent to the electric alloy steel sand casting division, until now the only Howard plant sand casting stainless steel. Last month, the company installed three induction melting furnaces in its newly named Alloy Steel and Iron Casting Division in Chicago. The plant, formerly known as the Semi-Steel Division, is now manufacturing all-core sand mold castings in low and high temperature steels, including stainless, nickel-iron alloys and ductile iron.

Howard also started casting beryllium copper this month in its aluminum and bronze division, making it the only jobbing and production foundry supplying this alloy in the Illinois region. At the same time, the company has just completed two semi-mechanized production line systems for dry sand molds, one in its aluminum division and another in its magnesium plant, which manufactures high temperature magnesium alloy castings for the aircraft industry. Both plants are in Chicago.

## New Tuna Clipper

Marking a revival in San Diego tuna clipper construction after a lapse of two years, the keel of an all-steel fishing vessel was laid March 15 at the National Steel and Shipbuilding Corporation plant. The vessel is the first of two ordered by Joe and George Soares, brothers long identified with the local tuna fishing industry. The ships each will cost \$500,000. Plans call for an overall length of 127 feet, 30½-foot beam and cargo capacity of 330 tons. They will embody the latest refinements in tuna boat construction developed by National Steel. The improvements include a more efficient reduction gear on the main 8-cylinder Enterprise diesel engine, and a five-bladed propeller.

## Uruguay Railroads 100% Dieselized

The South American nation of Uruguay will have the distinction of being the very first country in the world with a completely dieselized railroad system. The country will achieve this distinction by the end of 1954 when 38 GE diesel electric locomotives are delivered. A contract for these locomotives was recently signed between the Uruguayan government and General Electric. A spokesman stated that the tremendous economies made possible by the use of dieselized equipment on the railroads will wipe out the railway deficit.

**YOUR COPY OF DIESEL ENGINE CATALOG** in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

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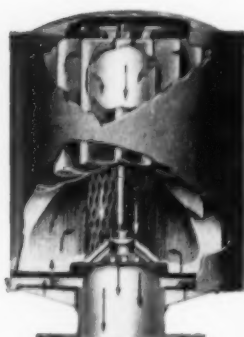
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FOR EVERY  
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"SPECIFY PIERCE CENTRIFUGAL GOVERNORS ON YOUR ENGINES"

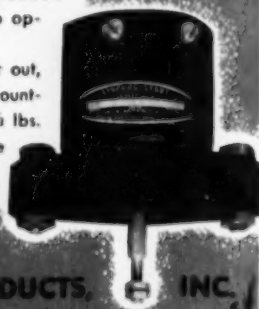
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6, 12, 24, 32 VOLTS • 10 LB. PULL OVER 1/2"

For operating throttles, chokes, fuel pump racks, anti-dieseling devices, or any application not requiring more than 10 lbs. pull over 1/2" stroke. Ruggedly constructed and entirely enclosed for dust and splash proof operation. It is furnished with a mounting bracket and threaded plunger for connecting to operating linkage.

Overall length, plunger out, 4 1/4". Overall width of mounting ears 3 3/4". Weight 2 1/2 lbs. Special plungers can be supplied if required.

**COMPACT  
DUST  
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BRONZE, STEEL, STAINLESS STEEL—1/4"-36" I.D.  
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*How much of your engine maintenance bill is due to repair of breakdowns that could have been avoided—if you'd had advance warning?*

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*Man knows only that  
which he can measure*

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## Florida Diesel News

By Ed Dennis

CUMMINS DIESEL Engines of Florida supplied the two 300 hp diesels for the 60 ft yacht *Snuffy* being built by Huckins at Jacksonville for C. G. Fuller.

THE *R. V. Bear* and *Atlantis* floating oceanographic laboratories stopped at Miami. A Superior of 400 hp and 2 Hercules 30 kw generators on the *Bear* while the *Atlantis* had a 400 hp. Enterprise diesel for power.

A MURPHY diesel model M-135 for the new 60 ft Biloxi type shrimper *Nancy Darnell* with Twin Disc clutch and 4.5:1 reverse and reduction gears. Twin Disc power take-off.

AMERICAN BOSCH Corp's new plant at Columbus, Mississippi is expected to be completed by April of this year. It will contain approx. 100,000 sq. ft. and production is scheduled to start immediately thereafter.

THE 80 foot *Bluff Creek* powered by Kennedy Marine Engine Co. of Biloxi, Miss., will contain two G.M. model 62200's plus two 20 kw Delco generating sets.

AN 8 cyl. Enterprise diesel 615 bhp. at 315 rpm. on the 115 ft *Judith Lee Rose* also in the engine room a 20 kw Nordberg diesel generating set with an Imperial generator.

THE *Aletes*; a West Indies refrigerated vessel with two 600 hp Cooper Bessemer diesels being refueled from Belcher Oil Co.'s Cummins powered tank trailer.

SHELLEY TRACTOR & Equipment Co. of Miami exported about \$40,000 worth of dieselized equipment to Cuba. 3 D8 Caterpillar tractors were also included in the shipment. The diesel machinery is to be used for clearing land on a new rice plantation.

CHARLES C. WELLES, president of Marine Motors, distributors of Lathrop diesel engines for Florida, Georgia and So. Carolina; is also president of the new firm Shrimp Boat Builders, Inc. of Jacksonville, Fla. One of the first trawlers launched was the 74 ft *Silver Thread* of Daytona Beach powered with a 200 hp Lathrop diesel.

FLORIDA Diesel Engine Sales, Jacksonville; supplied the General Motors 6-71 diesels for the 70 ft twin screw trawler *Dean & Barry* owned by Emory Pacetti of Pacetti and Sons, St. Augustine.

THE TOWN of Palm Beach received a model 25 Northwest crane powered with a Caterpillar model D318 diesel for digging pits; from Florida Georgia Tractor Co., Miami.

A CUMMINS diesel model HRP 600 rated at 165 hp with a Twin Disc clutch at the new oil well on 40 Mile Bend; the well produces about 76 barrels of oil a day.

## All These People Can't Be Wrong!

Use the Merlin Servicemaster to recondition your injector nozzles in less time than it takes to pack and ship them.



Diesel engine manufacturers, shipping companies, railways, transport operators, and government departments use the Servicemaster.

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**Boston Fuel Injector and Engine Service**  
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**Womack Bros. Diesel Service**  
Jackson, Miss.

**Wolverine Electric Cooperative**  
Big Rapids, Mich.

**The Cooper-Bessemer Corporation**  
Grove City, Pa.

**Hartford Machine Screw Company**  
Waterford, Conn.

**MacNamara Construction Company**  
Toronto, Canada

**Perkins Diesel Service**  
Mesa, Arizona

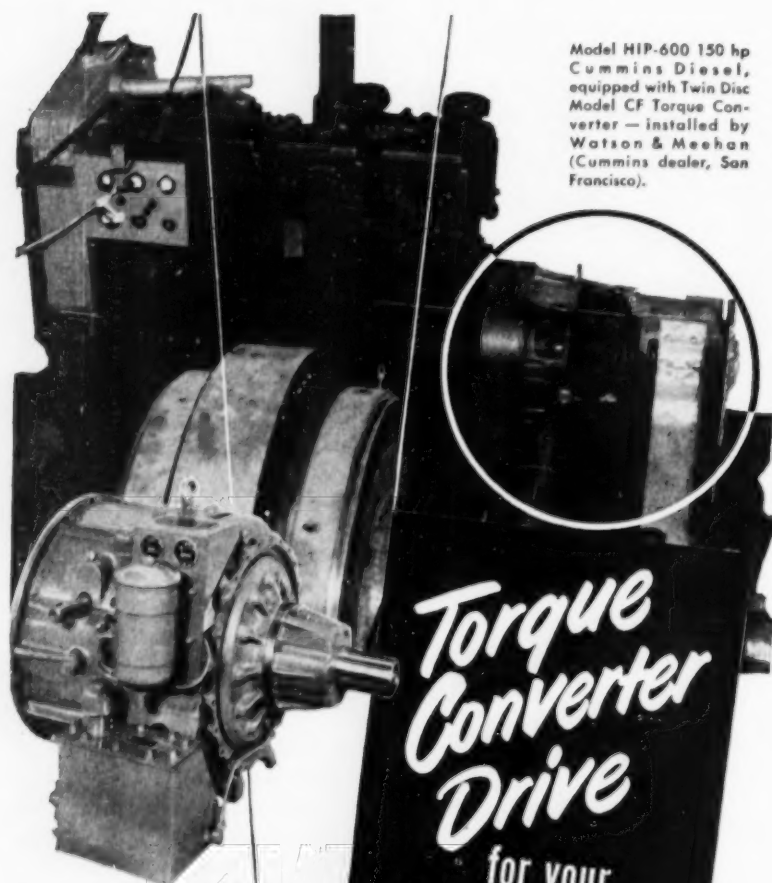
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Model HIP-600 150 hp Cummins Diesel, equipped with Twin Disc Model CF Torque Converter — installed by Watson & Meehan (Cummins dealer, San Francisco).

**Torque Converter Drive**  
for your  
**New Power Unit**

Twin Disc Torque Converters are available in 3 sizes, with 7 capacities each, for any type gas or diesel engine rated from 40 to 750 hp. The 3-stage design provides these advantages:

- Picks up heavy loads smoothly without slipping the clutch.
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- Absorbs shock loads... saves clutches, engines, drive line components.
- No mechanical connection... drives through fluid action.
- Engine operates in maximum efficiency range at all times.
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Thinking about a new power unit? If so, be sure to ask your dealer about the money-making advantages of equipping your power unit with a Twin Disc 3-Stage Torque Converter. Find out how a small, additional investment will return multiplied dollars in faster work cycles, easier operation, longer equipment life... specify Twin Disc, built by the pioneer of Torque Converter drives.



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## Inland River Reports

By David I. Day

CAPT. L. C. Jones and his men had quite an exciting time at New Orleans recently when, coming out of the Industrial Canal his boat, the *Frank B. Durant*—2400 hp pusher of the Oil Transport Co., New Orleans smashed into an Italian freighter or vice-versa. One of the *Durant's* 20,000-barrel barges was damaged. However, the boat delivered the crude oil at Cincinnati without further loss of time. This boat is one of the fine 1950 crop of boats powered with General Motors engines.

WE congratulate the towboat *Northern* of the MVBL fleet for its fine job the last month towing steel, 15 barges and more per trip on the upper Ohio. She has a fine chief engineer in the person of Edwin Gebhart. His Fairbanks-Morse engine room sparkles.

THE HILLMAN-built *TradeWinds* of the American Barge Line looking as pretty as her name is back on the Ohio after a period of service in the South. This General Motors 1400-hp boat has Capt. Dan Hogan as master now.

THE MOST photographed boat as spring starts is the veteran *Ernest T. Weir* built by Dravo in 1941, powered with twin Superior engines. This popular MVBL boat has been working in the old Tennessee River called by the tourists "the Great Lakes of the South." "From Mrs. Sam Hughes, Birmingham, Ala." says a color pix of the boat, looks like a picture was taken near the big Kentucky Dam.

SWIFT CURRENT on the Mississippi near Greenville, Miss., had all the boats breathing hard recently. J. K. Wilkinson, New Orleans, writes of seeing the *Harriet Ann* (3200 hp., Fairbanks-Morse twins) doing double tripping past "the rapids." He rates chief engineer Bob Bradley of the *Harriet Ann* very highly.

FINE REPORTS continue to come in on the brand-new Avondale-built *George W. Banta* of the Capt. J. W. Banta fleet (Plaquemine Towing Company) now at work. "She is a natural for the lower Miss and the canals," one report was worded. She's using General Motors twins, 1800 hp.

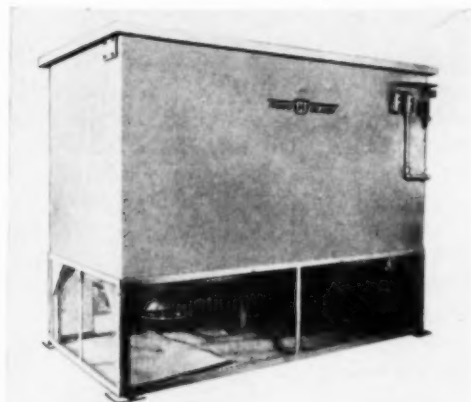
THE TVA's new towboat *Lucy E* is at work. She is strictly for short runs. Sleeping equipment is merely two berths. Built by St. Louis Ship, she has General Motors engines totaling over 400 hp.

THE *Jeffboat* of the ABL fleet has been doing yeoman service on the upper Ohio in the iron and steel trades. We noted her below Huntington, West Va., pushing 19 barges downstream. She is powered by Fairbanks-Morse twins, 3200 hp.

THE Superior-powered *Cornell* of the Union Barge Line has elicited mail-praise leadership of the month. Seven letters call attention to her fine towing. One letter contained a picture of her in mid-channel pushing 14 barges of steel and some empties. She is rated at 2800 hp.



## New Model Parts Cleaning Machine



New models of Turbo-Blast parts cleaning machines, which effectively combine the three basic factors in cleaning science, physical force, chemical detergency and heat, have been announced by Storm-Vulcan, Inc., of Dallas, Texas. Models range in sizes from 20-gallon solution capacity to 2300-gallon capacity for applications in cleaning, degreasing and stripping. All models are equipped with impellers which create a violent, fast-cleaning scrubbing action. These machines thoroughly clean everything from engine blocks to nuts, bolts and small parts, removing all types of greases, oils and drawing compounds. No recessed areas in the parts are left undecanted.

Some models are equipped with baffle plate covers which permit powerful agitation with two-layer stratified cleaning materials heretofore used only in soak tanks or with mild agitation. Turbo-Blast units are heated by steam, fuel oil, natural gas or manufactured gas, thermostatically controlled for effective and economical use. According to the manufacturer, up to two-thirds can be saved in cleaning cost, and work can be done in one-third the usual time and in one-third the floor area. Existing models meet most industrial and maintenance requirements. However, special Turbo-Blast cleaning systems can be devised, such as conveyonized systems, with varying patterns and fluid application. Catalog and application data available from the manufacturer, Storm-Vulcan, Inc., 2225 Burbank, Dallas, Texas.

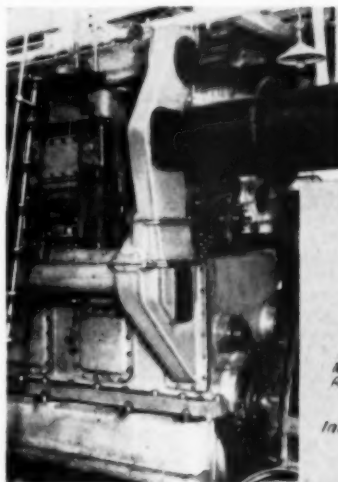
## Service Manager



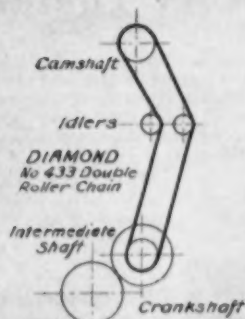
J. W. Fisher

J. W. Fisher has been promoted to service manager for Cummins Sales & Service, Inc., in Wichita, Kansas. President Ken W. Davis announced recently from Fort Worth headquarters of the organization. Mr. Fisher formerly served as Shop Foreman in the same location. A long-time employee of Cummins Sales & Service, Inc., he began at the Wichita branch in 1943. He has been with the Wichita group since. Born in Wichita, Mr. Fisher considers himself a native of Clearwater, Kansas. He received his education in Clearwater schools.

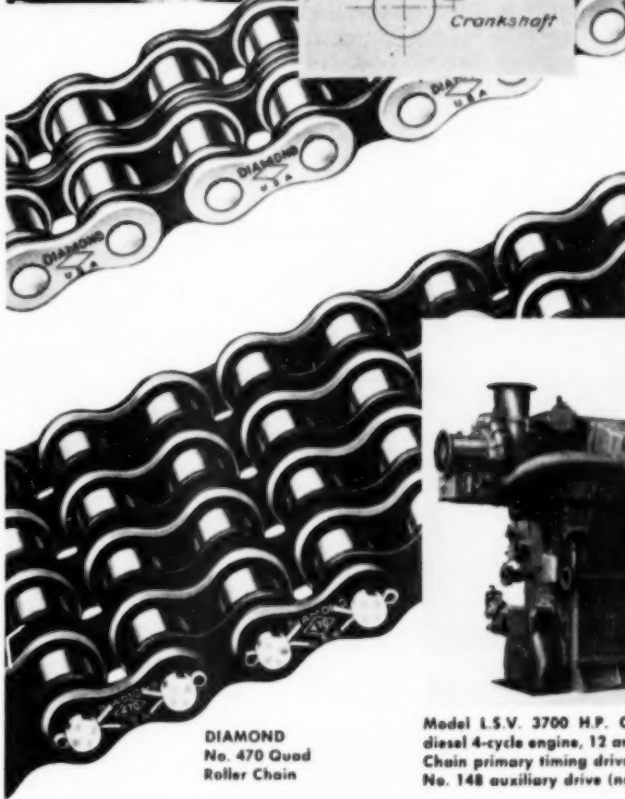
# IMPROVED DRIVES for DUAL-FUEL ENGINES



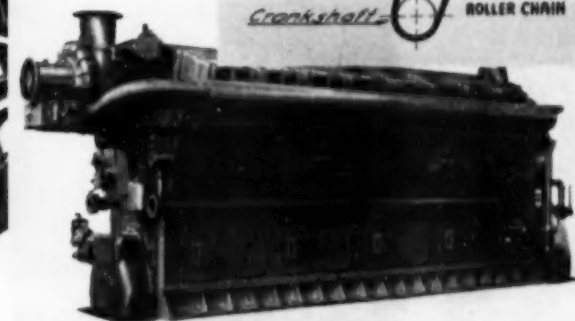
Fairbanks-Morse 2-cycle dual-fuel engine has DIAMOND Roller Chain Drive from intermediate shaft to camshaft.



DIAMOND No. 433 Double Roller Chain



DIAMOND No. 470 Quad Roller Chain



Model L.S.V. 3700 H.P. Cooper-Bessemer super-charged diesel and gas-diesel 4-cycle engine, 12 and 16 cylinder V-type has Diamond No. 470 Roller Chain primary timing drive crankshaft to intermediate shaft. Also Diamond No. 148 auxiliary drive (not shown in diagram).

• Engine makers—including the finest in the land, have ample proof of the long-life dependability of Diamond Roller Chains. Application on dual-fuel engines have been particularly notable, both as original equipment and on engines converted to dual-fuel operation in the field.

They are adaptable to a wide range of shaft centers and speeds,—simplify design,—create no end thrust,—remain quiet in operation,—and, they have the uniformity of quality and high reserve strength demanded by most discriminating engineers.

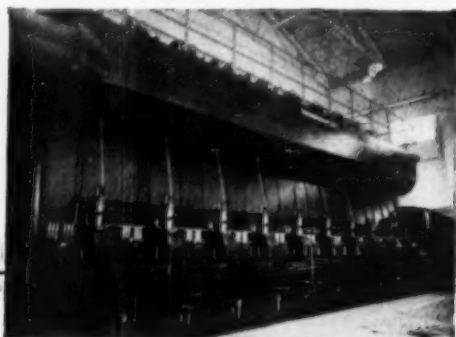
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Leading Diesel engine manufacturers *know* that buyers appreciate the trouble-free service given by Manzel protected equipment. They *know* that Manzel Force Feed Lubricators never forget or make mistakes . . . that they always supply every wearing point *exactly* the amount of oil it needs. As a result, moving parts function efficiently for many more years.

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A DIVISION OF FRONTIER INDUSTRIES, INC.

## Mid-Continent Diesel News

By Jack F. Cozier

MIDWESTERN Engine & Equipment Co. of Tulsa announces the sale of four Unit cranes and shovels equipped with General Motors diesel engines. The diesel units are equipped with Pierce governors and Delco-Remy starting motors.

A COOPER-BESSEMER gas compressor, Type GMW-6, was sold for use in Louisiana. This six-cylinder natural gas compressor is a 1500 hp unit with a bore and stroke of 18 x 20 and has a Woodward U-G governor. The Cooper-Bessemer Corp. of Tulsa made the sale.

MILLARD BLAKE of Sedan, Kansas, purchased a Model 62-400 General Motors diesel unit to use for rock crushing. The unit was purchased from the Diesel Power Co. of Tulsa.

THE Clayton Dwyer Drilling Co., Pampa, Texas, has purchased through the Bovaird Supply Co. a General Motors model 12-103 HD dieselized unit from the Diesel Power Co. of Tulsa. The unit will be used as a mud pump.

THE SCHULSTER Torpedo Co. of Garnett, Kansas, is building a well treating unit using a General Motors Model 4031 C unit driving a Gardner-Denver Pump through an Allison torque converter mounted on a General Motors diesel truck. The unit will be ready for operation some time during the month of March.

SOLD through the Clarence L. Boyd Co., Tulsa, Oklahoma, were five International Harvester diesel tractors. Four of the tractors were sold to be used for road construction work and one unit for railroad maintenance work. Two of the tractors were model TD-18 with 89 hp, two others were model TD-14 with 66 hp, and the other tractor was a model TD-9 with 41 hp.

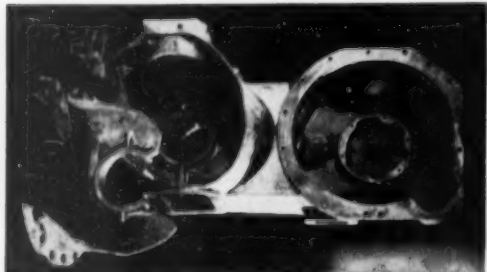
THE SAPULPA Tank Co. Sapulpa, Oklahoma, purchased a 100 kw Murphy Weld-Power unit from the Murphy Diesel Co., Tulsa, Oklahoma, to be used to power a number of small ac-dc welders. Some of the equipment on the power unit is a Delco-Remy starting motor and an Electric Machinery generator.

SOLD TO the Quapaw Construction Co. was a Murphy diesel unit model 112 to be used to power a Pioneer Rock Crusher. The Murphy Diesel Co., Tulsa, Oklahoma, made the sale on the 125 hp unit. Equipment on the unit included a Delco-Remy starting motor.

RAY GILBERT has bought an International Harvester Truck model RDC-405 from the International Harvester Co., Tulsa, Oklahoma, to be used for contract hauling. The truck is powered with 175 hp Cummins diesel engine.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

## BEFORE



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## Electro Proximity Pick-up



Development of a new proximity pick-up impulse generator, Model 4900, is announced by Electro Products Laboratories, Inc., of Chicago. It was designed as a low speed complement to Electro's Model 3010A magnetic pick-up. As a high frequency carrier operated transducer, it works on a principle similar to the military mine detector and may be excited either

by magnetic or nonmagnetic metals. With suitable auxiliary equipment, this new proximity may be used to indicate mechanical or electrical counting, linear or angular position, rate of travel, sequence timing, vibration frequency, angular or linear speed, or other functions which involve moving metal components. This system consists of a transducer connected by a ten-foot cable to a control unit which contains the power supply and other electronic components. It produces a dc. voltage of constant amplitude when any metallic mass is brought near the pick-up. No mechanical contact is made with the exciting metal. The dc. voltage remains constant as long as the exciting metal is in close proximity to the pick-up and drops to zero when it is removed. The rise and delay time of the voltage is extremely fast thereby producing a defi-

nite snap action. It produces a constant output voltage which is independent of either the speed of the actuating mass or the pick-up spacing.

In addition to the standard stock models described, special units can be actuated by the presence of exciting metal several inches away from the pick-up. An illustrated circular describing all features of the Model 4900 Proximity Pick-up may be obtained by writing to Electro Products Laboratories, Inc., 4501 N. Ravenswood Ave., Chicago 40, Illinois.

## Develops New Cleaning Material

Oakite Products, Inc., manufacturers of industrial cleaning and allied materials, have announced the development of a new cleaning material, Oakite Composition No. 93, specifically designed for use in steam-generating equipment and in steam guns where the solution is siphoned from an auxiliary tank. Oakite Composition No. 93, the manufacturers state, is a white, free-flowing powdered material which is readily and completely soluble in water in a broad range of concentrations and use. It possesses exceptionally high sequestering ability and, when added to water up to 20 grains hardness, will show no precipitate or turbidity. Normal working concentrations range between 1/4 and 4 ounces per gallon of water. Additional information about this new steam-cleaning material will be sent, without charge, to readers addressing Oakite Products, Inc., 1001 E. First Street, Los Angeles 12, Calif.

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THROUGH EACH 27"  
"HIGH FLOW" ELEMENT

"High flow effective oil filtration at its best" is what you'll say when you see how all moving parts are thoroughly lubricated with clean-abrasive free oil.

With the patented Briggs DISC TYPE CARTRIDGE you'll reduce engine wear and get longer and more effective filter element life.



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1. GREATER filtering area with MORE dirt capacity.
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3. MORE CLEAN filtered oil circulates more often with LOWER PRESSURE DROP.
4. LONGER "HIGH FLOW" cartridge life requiring fewer changes than ordinary filter media.
5. CAN BE USED ON all railroad diesel locomotives.

DOUBLE DUTY—cuts your inventory. Can be used for DIESEL LUBE OIL as well as for BULK FUEL FILTRATION. Let one Briggs element do both big jobs at their low cost.

## COSTS NOTHING TO PROVE

Ask about a trial . . . see for yourself how the high flow rate, patented Briggs features fill the bill. See how you can get today's best filtration buy for much less than you would expect to pay.



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QUARTER OF A  
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WRITE FOR DETAILS. NO OBLIGATION

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Please send data sheet on Briggs disc type cartridges and tell us how an installation can be made to prove what you say about this revolutionary type filter cartridge. We understand that it will cost us nothing to "see what you have."

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**P&H** DIESEL ENGINE DIVISION  
**HARNISCHFEGER**  
CORPORATION CRYSTAL LAKE ILLINOIS





## THE WINNER OF DIESEL PROGRESS PLAQUE FOR THE SECOND YEAR

Replica of the award plaque which will be presented to the REA winner by our editor, Rex W. Wadman. The presentation will take place at the Melbourne Hotel in St. Louis on April 26th.



For the second successive year, the Wolverine Electric Cooperative has won the coveted DIESEL PROGRESS efficiency award for their Johnson plant, Hersey, Michigan. The DIESEL PROGRESS plaque has been awarded to the most efficient REA internal combustion plant for the past three years.

The first award was made for the year 1951 and was won by the Graham County Electric Cooperative, Pima, Arizona. The presentation was made to the manager at the REA annual meeting held in Milwaukee, April, 1952.

The second award for the year 1952 was won by The Wolverine Electric Cooperative, Big Rapids, Michigan, for their Hersey plant. The presentation of this award was made to the manager at their main office in Big Rapids, last April.

Now, for the second time in a row, the Wolverine Electric Cooperative has won the award for the same plant. The plant's manager will again receive the plaque. The presentation will take place at the Melbourne Hotel, St. Louis on April 26th. The editor, Rex W. Wadman, will make the presentation. New description and details on the winning plant will appear in the next issue of DIESEL PROGRESS. This contest, originated and fathered by DIESEL PROGRESS, has been hotly contested

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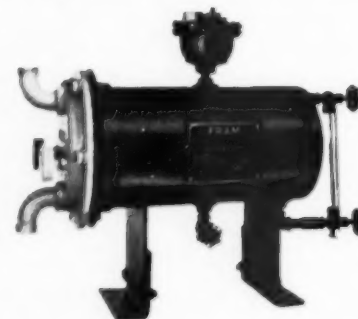
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Water is known to be a primary cause of injector repairs and injector failures. This NEW Development in the Diesel field will eliminate your fuel problems and allow your Diesel to perform more smoothly.

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each year and has done much to bring the large number of REA generating plants more closely together. It encouraged the overall operating efficiency of this large and growing group of diesel, dual-fuel and natural gas engine users.

The conference on April 26th, incidentally, is not restricted to REA Cooperatives exclusively. The committee extends its invitation to any municipality or utility desiring to send a delegate. For additional information, contact Harry F. Collins, Assistant Manager, Illinois Rural Electric Co., P.O. Box 186, Pittsfield, Illinois.

#### Hugo H. Haas Retires



Hugo H. Haas

Hugo H. Haas, civilian head engineer in the Bureau of Ships, Navy Department, has retired to open a consulting office. Mr. Haas, with a background of 48 years in the diesel industry, is almost a by-word in the business. Educated in Switzerland, he was connected with firms in England, Switzerland and, since 1916, in the U.S.A. In 1923, he joined the U.S. Army Engineers. He is extremely well-known for his extraordinary designs of river towboats, self-propelled pipeline dredges and seagoing hopper dredges. During the war he was invited to take over the Internal Combustion Engine Section for the Navy Department.

Despite his retirement, Mr. Haas states that he will remain in business in a consulting capacity. All of his many friends wish him well in his new undertaking. His home address is 3105 Buena Vista Terrace, S.E., Washington 25, D.C.

#### Miami's New Sewage Treatment Plant

In the City of Miami's new, twenty-four million dollar sewage treatment plant now under construction, five Worthington dual fuel engines will contribute to keeping the beaches free from dangerous contamination.

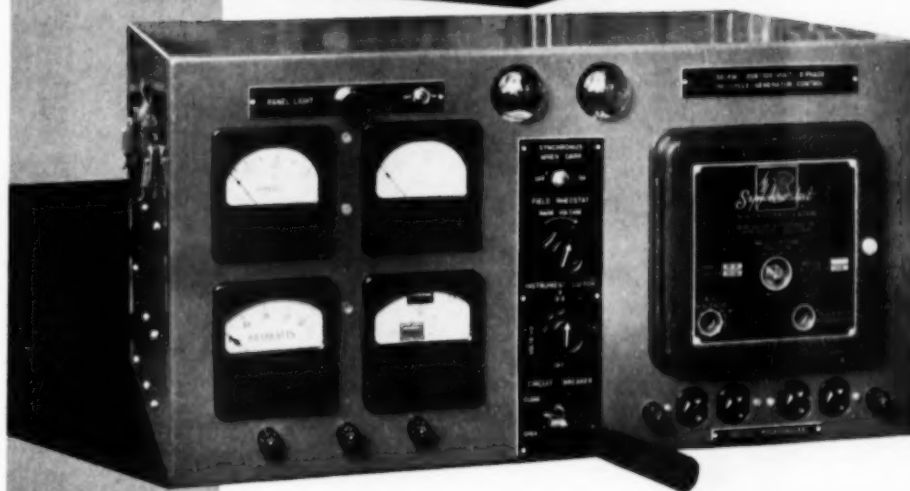
One of the engines—a 7-cylinder dual fuel 480 h.p. machine, will drive an E-M generator to supply electric power to the plant.

Four 6-cylinder 410 h.p. engines will drive the blowers to activate the sewage sludge beds. Two of these will be dual fuel engines and two will be straight gas spark ignition engines. All of the engines will operate at 514 rpm. The engines will be fueled by the gas generated from the digested sludge, after aeration by the blowers driven by the engines. The dual fuel arrangement permits changing over from gas to oil, or any combination of the two fuels, as variable conditions may require.

The specifications for the new plant were drawn up by Metcalf and Eddy of Boston. The plant itself will be located on Virginia Key in Biscayne Bay, and the effluent, after treatment, will flow out to the ocean.

In the treatment plant, approximately thirty Worthington pumps will be installed to handle sludge, effluent, and other liquids.

## DIESEL DRIVEN GENERATOR CONTROLS *for Industrial or Military Applications*



Typical unit control for generators of 15-150 KVA capacity with complete metering, regulating, synchronizing and protective devices.



LAKE SHORE can custom-engineer and build a variety of units in A. C. and D. C. types for engine generator manufacturers. Models for either portable or fixed installations can be furnished for industrial applications as well as to government specifications. Special constructions for arctic or tropical use also can be supplied.

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Are you a contractor buying new power for your equipment? Are you an engineer designing a new plant? Do you need a certain engine to meet certain requirements? Do you sell engines and want to know what your competition is doing? Do you use or service diesel, dual-fuel or gas engines? THEN YOU NEED VOLUME 18 of DIESEL ENGINE CATALOG!

## VOLUME EIGHTEEN

- Brush-ABOE
- American Locomotive
- Atlas Diesel Engine
- Baldwin-Lima-Hamilton
- Buda
- Burmeister & Wain
- Caterpillar
- Chicago Pneumatic
- Cleveland Diesel
- Continental
- Cooper-Bessemer
- Cummins
- Deere
- Detroit Diesel
- Deutz
- Electro-Motive
- Enterprise
- Fairbanks-Morse
- Graymarine
- Hallett
- Harnischfeger
- Hercules
- Hill
- Ingersoll-Rand
- International Ferromont
- International Harvester
- Kaasenberg
- Lister-Blackstone
- Mack
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- Worthington

This new edition of DIESEL ENGINE CATALOG gives you five big sections, five books in one:

- An engine section fully illustrated with complete technical descriptions and specifications.
- An accessory section describing engine and plant accessories.
- A transmission section describing torque converters, etc.
- A classified buyers' guide giving valuable information as to the source of many items you buy in the diesel industry.
- The advertising section which further details the manufacturer's product.

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Improvements and changes are normal to a healthy, growing industry. Unless your information source brings you up-to-date on all these changes and improvements, you are not receiving the maximum benefits due you. Volume 18 of DIESEL ENGINE CATALOG performs this service. It is new. It is complete. It is as modern as the latest engine improvement. Every major engine manufacturer is represented between its two covers. It answers your need for complete, concise and easy to read information.

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Enter my order for a copy of the DIESEL ENGINE CATALOG, Volume 18, edited by Rex W. Wadman, for which I enclose \$10.00 (plus sales tax if for delivery in California). Copies may be ordered in the Sterling Area by remitting £4.00 to DIESEL PROGRESS, St. Paul's Corner, Ludgate Hill, London, E.C.4.

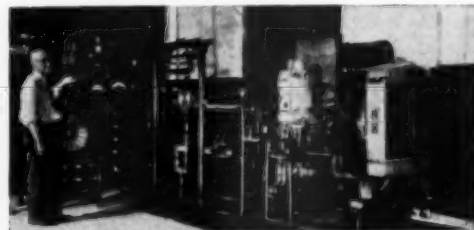
NAME.....  
 TITLE.....COMPANY.....  
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 CITY.....ZONE.....STATE.....

### Pickering Governor's New Mansion



Entrance and tower of the new Farris plant.

A yellowing manuscript, dated October 7, 1862, and a modern industrial plant in Palisades Park, New Jersey, tells a story of the birth and development of a device that has been virtually indispensable to the diesel industry. In 1862, the United States Patent Office put its stamp of approval on a centrifugal governor designed by Thomas R. Pickering. It was a relatively simple device. Some of the older mechanical engineers of today can remember "cutting their teeth" on a Pickering governor that was changed very little from the original design—the familiar fly-ball type.



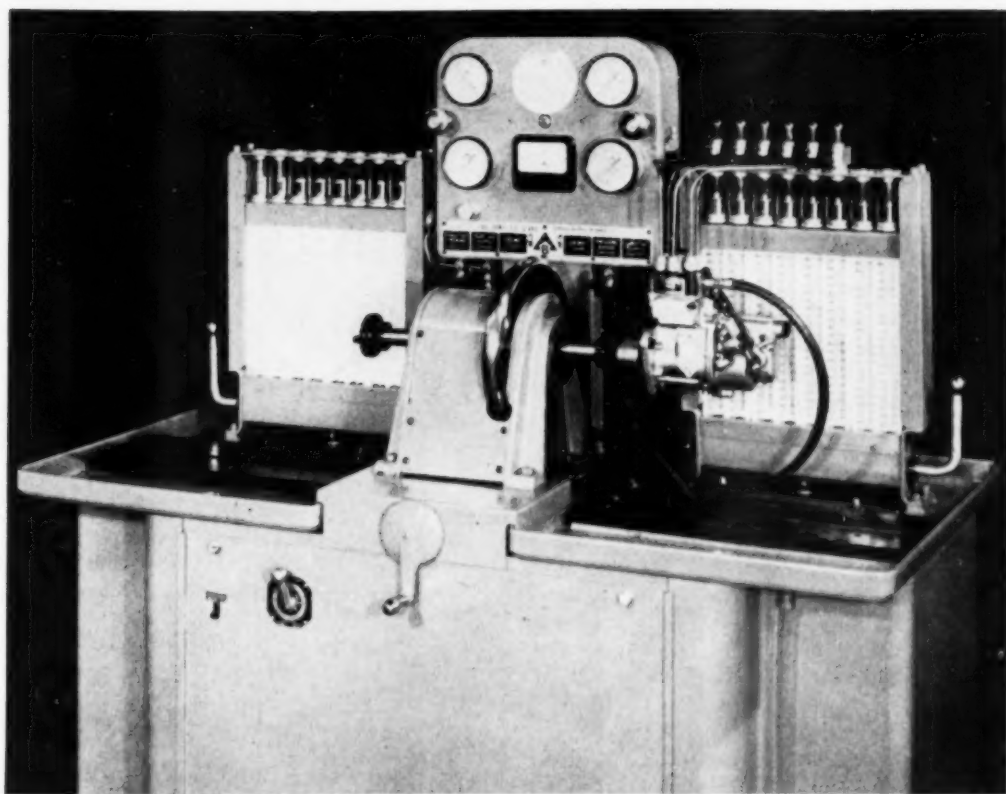
This dynamometer, for testing and setting Farris Pickering governors, accurately simulates operation of the governor in the field.

From that modest beginning, through nearly a century of development, the Pickering governor has become a vital part of industry throughout the world. The oldest mechanical governors, and the only brand today offering both mechanical and hydraulic types, Pickering is represented by more than 600,000 governors in use in power stations throughout the world, by the United States Navy, and in many of the foremost prime movers. When, some months ago, Pickering governor became an affiliate of Farris Engineering Corporation it joined forces with a fast-growing group of precision industrial equipment manufacturing companies. Many of Pickering's key personnel made the transition with the company. At the same time, the governor moved into his new "mansion"—a brand new plant, housing all the Farris affiliates, on a four-acre tract in Bergen County, New Jersey.

Serving the chemical, petroleum, marine, automotive, mining and many other fields, the Farris affiliated companies include, besides Farris Pickering, Farris Engineering Corporation, makers of safety and relief valves; Farris Stacon Corporation, temperature regulators; Farris Flexible Valve Corporation, pinch-type valves; Farris HydroTorque Corporation, remote control hydraulic positioners, and Farris HydroSeal Corporation, elastic piston seals.



## INJECTION PUMP CALIBRATING STAND



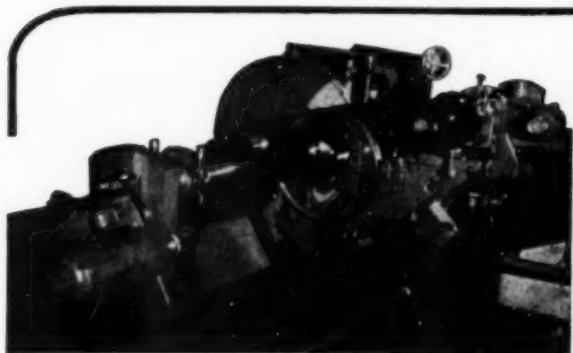
**B**ACHARACH Industrial Instrument Co., Pittsburgh 8, Pa., has added to its line of diesel shop equipment a "universal" test stand for calibrating all popular makes of multi-plunger and distributor types of fuel injection pumps, including American Bosch APE and PSB pumps, International Harvester pumps and Cummins pumps.

Identified as "GP-400" pump calibrating stand, it is said to be especially useful to diesel repair and rebuilding shops, fleet maintenance depots and injector service stations. It is designed to meet shop needs for injection pump testing equipment that will take hard use and can be operated rapidly and competently without special skill or training.

Outstanding features of the stand include volumetric measuring graduates of ingenious construction and distinctive scale design to afford maximum

readability—accurate pressure gauges each specially calibrated for a specific test application—automatic revolution counters, precision speed indicator—electric tachometer—and micrometric positioning devices; an assembly of instruments which is unique for its completeness, utility and visibility. An equally important service factor is the sturdy all-metal construction of the stand which gives it the necessary rigidity to maintain perfect pump-drive alignment and trouble-free operation during its life.

By following the instruction manual which is furnished with each stand, any mechanic qualified to handle diesel repair work can calibrate and adjust injection pumps to restore the original factory settings after rebuilding or repairs. Thus many pumps, which otherwise would have to be replaced, can be returned to service with complete assurance that they will operate to exact specifications.



ONE OF THE LARGEST CRANKSHAFT GRINDING MACHINES EVER MADE!

## CRANKSHAFT GRINDING SERVICE

- ★ Hard Chromium Plating Service
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Grinding Machines to handle crankshafts from the smallest up to those with a stroke of 16" and length of 200". Complete grinding service for locomotive, stationary, marine, and compressor crankshafts. Also camshaft repair and grinding service for industrial, marine and locomotive engines.

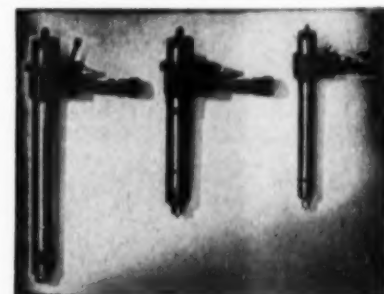
Established 1924 . . . 30 years experience grinding crankshafts!

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The ADECO Model "P" Single-Unit Fuel Injection Pumps are of the "port-control" type. Simple and rugged in construction and precision built by ADECO craftsmen, these pumps are extremely reliable.



ADECO injectors are available in four sizes and a number of different styles and lengths. The ADECO water-cooled injectors are made in size No. 4 only, and have built a reputation for excellent performance where heavy fuel oils are burned.

When Ordering Fuel Injection Equipment  
**SPECIFY ADECO!**

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FOR ALL FUEL OIL STORAGE TANKS  
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Fairbanks-Morse 1136 KW.  
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Sta., Los Angeles, Calif. Phone NEVada 6-2517

## Gulf Coast Diesel News

By Michael T. Pate

ZACH Brooks Drilling Company, El Dorado, Arkansas, has bought from Waukesha Sales & Service, Houston, a model 6 LRDU diesel developing 280 hp. which the company will mount to repower a 14-inch mud pump in deep well drilling service.

CADDO Chemical Company, Wichita Falls, Texas, will use a series 71, General Motors twin six diesel to drive, through an Allison torque converter, a high-pressure mud pump for use in sand fracturing operations in completing oil wells.

HUMBLE OIL & Refining Company, Houston, has bought through Stewart & Stevenson Services, Inc., of Houston, three General Motors series 110, diesels, each to repower a 100 kw. Delco 120/240 volt d.c. generator for use on craft used in the company's offshore drilling operations.

NEW MEXICO Diesel Electric Company, Socorro, New Mexico, has bought from Waukesha Sales & Service, Houston, a Waukesha diesel model 190-DLCU and two Kohler electric plants each powered by a 180-DLC Waukesha diesel.

GRIBBLE Marine Service, Houston, has bought a Buda diesel model BD153 marine auxiliary unit to drive a 15kw. 125 v. dc generator for service on offshore drilling operations. The diesel, rated at 30 hp., was bought through Buda Engine & Equipment Company, Houston.

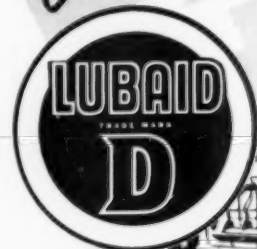
JOE GRASSO & Son, Inc., Galveston, have bought from Houston Engine & Pump Company, Houston, a Murphy diesel model M-150, delivering 150 horsepower at 1200 rpm, which will be used to repower the shrimp boat *Skipper Grasso*.

WESTERN Company, Midland, Texas, has bought from Stewart & Stevenson Services, Inc., of Houston, two General Motors series 110, diesels each equipped with Allison torque converters which will be used to drive high-pressure mud pumps for sand-fracturing in oilwell completion operations.

PENROD Drilling Company, Shreveport, La., has bought from Waukesha Sales & Service, a 6 cylinder Waukesha diesel, model 195 DLCU, rated at 40 hp. at 1200 rpm. which will be used to drive an electric generator on a drilling rig.

WILLIAMS Brothers Company, pipeline contractors of Tulsa, Oklahoma, have bought through Buda Engine & Equipment Company, Inc., of Houston, a 30 kw. generating set powered by a Buda model DT468 diesel which the company will ship to South America for use on a pipeline contract in Colombia, S.A.

*for cleaner  
Over-all combustion*



LUBAID-D is a diesel fuel additive that aids in achieving better, lower-cost performance, with shorter outages. LUBAID-D aids in dispersing gum, sludge and varnish. Aids in achieving free pumping. Aids in maintaining maximum compression pressures. Aids in achieving cleaner combustion, and reduction of port clogging and sticking valves.

## DISTRIBUTORSHIPS AVAILABLE **LUBAID COMPANY**

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Address Inquiries to Milwaukee Office

Manufacturers' representative now contacting the engine and compressor builders in the northeast section of the country is looking for an additional line that would apply to these accounts. File 514, DIESEL PROGRESS, P. O. Box 8458, Cole Sta., Los Angeles 46, Calif.

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STATIONARY & MARINE

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ADVANCES DEVELOPED BY  
SPECIALISTS LONG IN THE FIELD OF  
DIESEL DESIGN AND ENGINEERING

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**Diesels**

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*Insist on* **VELLUMOID** *for Quality*

**GASKETS AND SHEET PACKING  
FOR OIL, WATER AND GASOLINE**

THE VELLUMOID COMPANY • WORCESTER • MASS.

YOU SAVE UP TO  
50% WHEN GUTH  
COMPANY RENEWS  
YOUR BROKEN  
DIESEL CASTINGS

**GUTH COMPANY**  
McPHERSON, KANSAS

**NEW FROM DEALER'S STOCK  
1879 Buda Heads**

Old #DE12128B  
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With Valves & Springs  
List Price Over.....\$500.00 each  
Our Price, Lots of 6.....\$75.00 each  
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Lots of 50 - Write us  
Delco Remy Starters New #1108734-\$12.50  
All F.O.B. East Coast  
**ELECTRO DIESEL CORPORATION**  
P. O. Box 4842, Normandy Branch  
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**DIESEL ELECTRIC POWER  
for  
IMMEDIATE  
SHIPMENT**

Unit Capacities  
10 to 1875 Kva  
A.C. 50-60  
Cycles  
Various  
Voltages



Write or wire today for bulletins and complete information regarding these fine fully guaranteed, low cost DIESEL ENGINE GENERATING UNITS. Visit our plants at Sausalito (S.F.), California, and Jersey City, N. J., and see units in operation on our test stand.

"SPECIALISTS IN DIESEL POWER"

**A. G. Schoonmaker Co., Inc.**  
50 Church St., New York 7, N. Y.

**OPEN FOR BIDS**

2-450 H.P. Internal Combustion, Fairbanks-Morse Diesel Engines, Model 32E14, RPM 300, Woodward governor type IC, 300 RPM.

These are complete with switchboards, oil filters, generators, and exciters.

These engines can be demonstrated at their present location.

Contact Charles H. Seemann or Dale Borden at Jemez Mountains Electric Cooperative, Inc., Espanola, New Mexico. Phone 4255.

Bids will be accepted until April 21, 1954, 2 P.M., with our option to sell.

**Grinding and  
Hard-Chrome Plating  
of Diesel Engine  
Crankshafts - All Sizes**

Complete facilities for grinding, plating, Magnafixing, and electrically-controlled heat-treating. Largest hard-chrome plating plant in Mid-Continent area. **Experience • Quality • Precision**

**LANE PLATING WORKS**

5322 Bonnie View Road • P.O. Box 9115  
Phone FRanklin-1351 • DALLAS, TEXAS



**Kansas City Branch Manager**



Glenn A. Parker

Fairbanks, Morse & Co. has announced the appointment of Glenn A. Parker as manager of their Kansas City, Missouri, Branch House, succeeding W. W. Guernsey who recently retired after thirty-eight years of service with the company. Glenn, as he is known by his host of friends was graduated in 1926 from the University of Kansas with the degree of Bachelor of Science and Business Administration. He joined the Fairbanks-Morse organization in 1943 as a field engineer. In 1949 he became manager of the Diesel Engine Department of the Kansas City Branch, which position he held until his recent promotion to branch manager.

**Starts New Production Line**



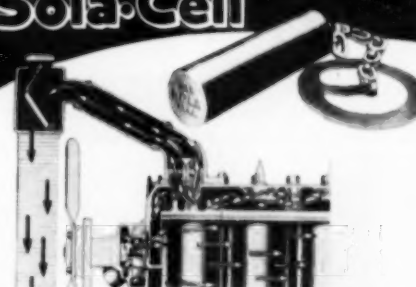
With the press of a button, Robert E. Huthsteiner, president of Cummins Engine Company, Inc., Columbus, Indiana, started the firm's new conveyor-type production line. The 300 foot line is part of the company's seven million dollar post war expansion program. Assembly operations on this line are conducted in a new building that is completely air-conditioned, dust proofed and illuminated to the highest standards. Pictured above, participating in the opening ceremony of the Company's continuing quality control program are: from left to right Robert E. Huthsteiner, president; Irwin Miller, chairman of the board; B. L. Wright, general foreman of engine assembly; C. R. Fox, vice president-Manufacturing; and Robert E. Gordon, editor-Columbus Evening Republican.

**DIESEL PRODUCTION MANAGER**

for America's largest rebuilder of GM fuel injectors. Excellent starting salary; opportunity to become key person in growing business. All replies confidential. File 513, DIESEL PROGRESS, P.O. Box 8458, Cole Sta., Los Angeles 46, Calif.

**REDUCE SCALE and RUST  
in DIESEL ROLLING STOCK**

WITH  
**Sola-Cell**



Here's the most practical and most inexpensive way to fight scale and rust in the cooling systems of Diesel and gas-operated rolling stock. Just drop a Sola-Cell in the radiator or insert it into the water jacket, and it retards the formation of scale and rust while gradually reducing old scale and rust. Used internationally by fleet operators, bus lines, heavy equipment operators, truck lines and many others. 90-day money-back trial for fleet operators.

**MAIL  
COUPON  
for 90-day  
MONEY-BACK  
TRIAL!**

The Latest in Water Treatment for Hot and Cold Water Systems, Stationary Engines, Buses, Automobiles and Trucks.

**SOLA CATALYTIC CO.**

520 Browder St.  
Dept. 12 Dallas, Texas

☐ Please send Sola-Cells @ \$3.95 each, C.O.D.

Name

Firm

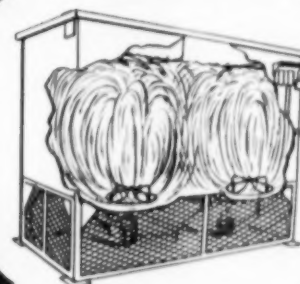
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City

State

**NEW! TURBO-BLAST  
CLEANING MACHINES**  
Fast, Economical Parts Cleaning!



Remove grease, oil, carbon and sludge deposits from engine blocks, parts, wheel bearings and equipment - in ONE-HALF to ONE-THIRD the time, labor and solution costs! Violent agitation creates scrubbing action that cleans thoroughly and eliminates hand-brushing. Heated with steam, fuel oil, natural or manufactured gas with thermostat control for efficiency and economy. Performance facts available.

Sizes for all requirements from small portable units to specially designed systems of any size. Conveyorized or batch types.

**STORM-VULCAN, INC.**  
2225 BURBANK DALLAS, TEXAS

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BY  
PERFORMANCE**  
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for  
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Send me Turbo-Blast Catalog.

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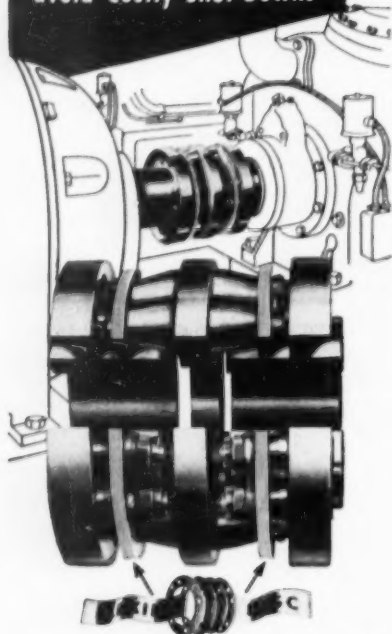
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**Specify THOMAS<sup>ALL METAL</sup>  
FLEXIBLE COUPLINGS**  
for Power Transmission to  
avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

**DISTINCTIVE ADVANTAGES**

FACTS	EXPLANATION
<b>NO MAINTENANCE</b>	Requires No Attention. Visual Inspection While Operating.
<b>NO LUBRICATION</b>	No Wearing Parts. Freedom from Shut-downs.
<b>NO BACKLASH</b>	No Loose Parts. All Parts Solidly Bolted.
<b>CAN NOT "CREATE" THRUST</b>	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
<b>PERMANENT TORSIONAL CHARACTERISTICS</b>	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.



Write for our new Engineering Catalog No. 51A

**THOMAS FLEXIBLE COUPLING CO.**  
WARREN, PENNSYLVANIA, U.S.A.

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# It puts the bite into dredging!

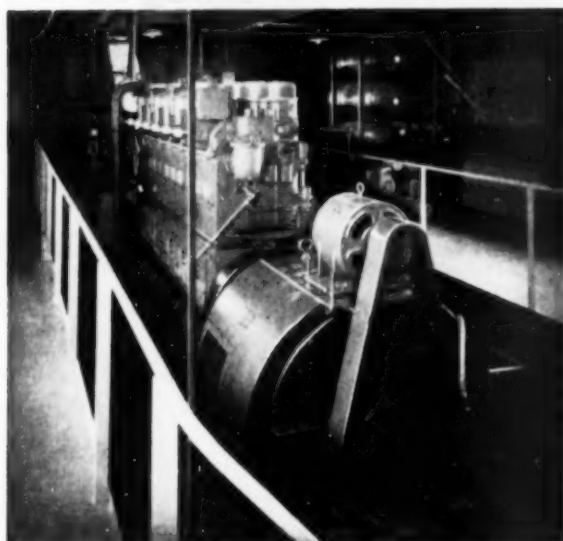


Dredge No. 8 of the Bedford-Nugent Company, Evansville, Indiana. Built by Maxon Construction Co., Inc., Tell City, Indiana.

## GENERATOR by ELLIOTT

The 16-inch dredging pump on this Ohio River dredge gets its power from an Elliott 300-kw, 450-rpm, 440-volt, 3-phase generator driven by an Enterprise diesel. The pump however is only part of the power need, considerably more being required for cleaning, grading and disposing of the sand and gravel pulled up from the river bed, entailing a number of vibrating screens, as well as belt conveyors and chutes for loading. The Elliott generator handles the load with characteristic dependability.

**MANY FEATURES** combine to make Elliott generators sound performers on difficult service. Bulletin PB 2000-1 has all the answers. Contact your local Elliott representative, or write Elliott Company, Ridgway Division, Ridgway, Pa.

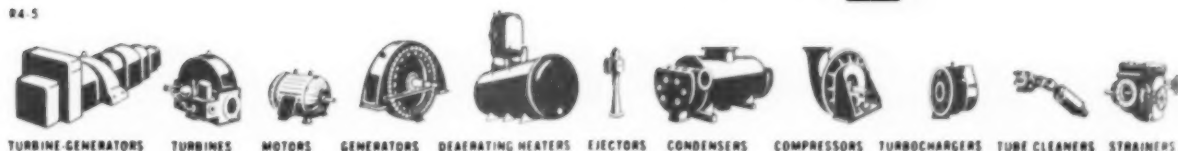


The engine room of Dredge No. 8, showing the Elliott 300-kw, 450-rpm, 440-volt, 3-phase generator with top-mounted exciter. This generator was custom-built to fit into the space and onto a foundation originally designed and constructed for use with a 300-kw, 450-rpm, direct-current generator.



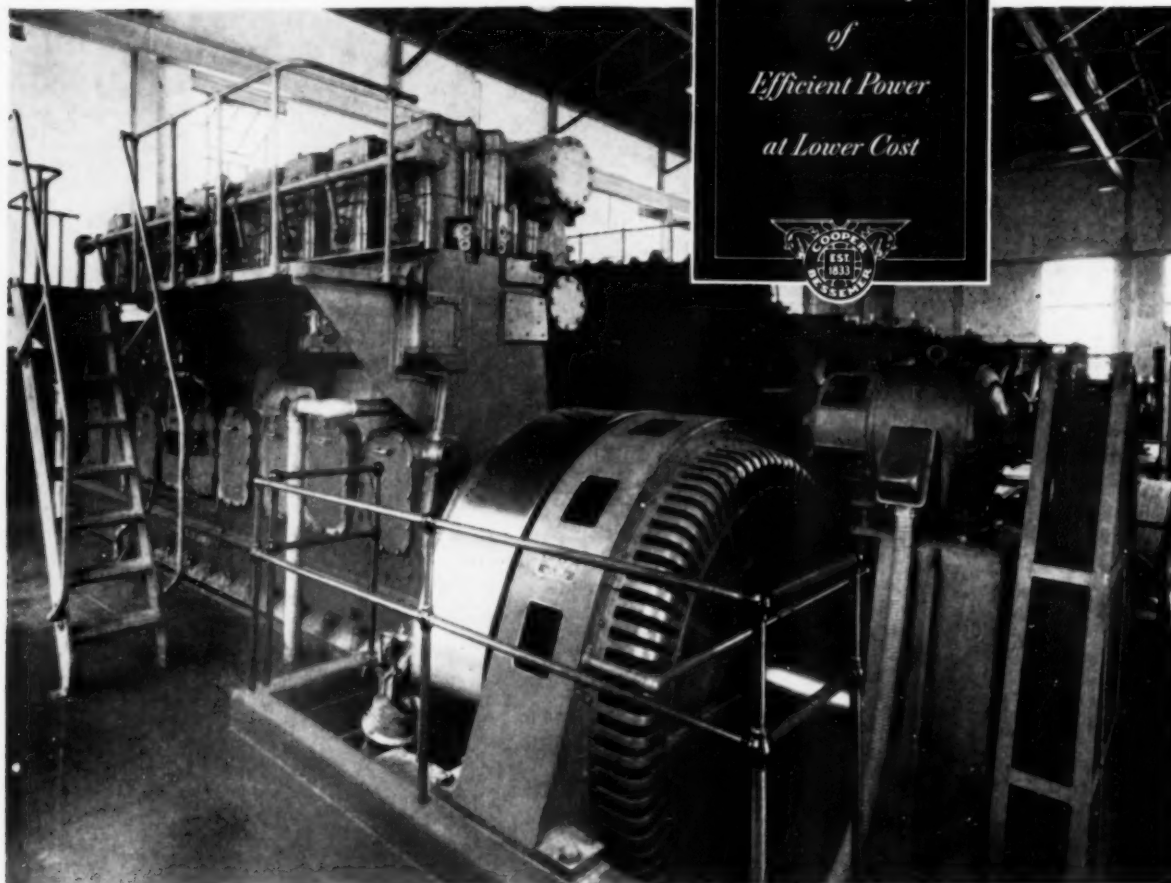
## ELLIOTT Company

R4-5



TURBINE-GENERATORS   TURBINES   MOTORS   GENERATORS   DEAERATING HEATERS   EJECTORS   CONDENSERS   COMPRESSORS   TURBOCHARGERS   TUBE CLEANERS   STRAINERS

Interior of Hearne's municipal power plant with latest 1715 hp Cooper-Bessemer supercharged Gas-Diesel in foreground. City Manager N. L. McCarver reports that engine's fuel and lube cost averages .00252 mills per kwh.



*Another Example  
of  
Efficient Power  
at Lower Cost*



## ***BIGGEST TAXPAYER IN THE CITY OF HEARNE*** **Cooper-Bessemer Gas-Diesel Power!**

**T**O the 4,778 citizens of Hearne, Texas, modern Gas-Diesel power has been a real boon indeed. Not only does their municipal power plant produce 64% of the city's total revenue, but it is largely responsible for low property taxes, a 92-acre municipal park, a golf course, fully equipped club house and a big swimming pool with bath house, to say nothing of street lighting, free school service and other contributory services.

Hearne's base generating load is carried by two Cooper-Bessemer Gas-Diesels — 1000 hp and 1,715 hp units installed in 1947 and 1950 respectively. Fueled mostly by gas, these modern, exceptionally efficient engines last year operated at a fuel cost of only \$0.002755 per kwh compared with \$0.00465 for older type oil burning engines in 1946.

Says City Manager N. L. McCarver, "We made a good investment in our Cooper-Bessemers. They are not over-rated and will pull their load without the least bit of trouble. The new turbocharged engine is now down for annual check-up and is the cleanest engine we ever saw."



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